RAILROAD GAZETTE

FRIDAY, MARCH 17.

Pope's Audible Railroad Signal.

A patent has recently been granted to Mr. Frank L. Pope, of Elizabeth, N. J., for an attachment to an ordinary optical signal, whereby a suitable audible signal or alarm will be sounded in case a locomotive should pass the former when it is in a position denoting danger.

Fig. 1 is an elevation of one form of optical signal to which this invention is applied, showing also a portion of the fixtures upon the locomotive or car. Fig. 2 is a plan view of the same partly in section; and figs. 3, 4 and 5 illustrate certain details in the construction of the mechanism.

In fig. 1 a signal post *C* is represented on the side of the track, one of the rails of which is shown at *A*. On top of the post is a disk-signal *D*, turning horizontally upon an upright spindle or shaft *d*, by the action of the weight *c*, but nominally held in check by the armature of an electro magnet *E*, having a stop *e*, projecting therefrom, which engages with one of four radial arms *F*, projecting from the spindle *d*, at an angle of 90 degrees from each other. When the disk *D* is in a position indicating "danger," it stands at right angles to the line of the track, presenting its face to the approaching train, as shown in fig. 1. When one of the radial arms *F* is disengaged from the pin *e* by the action of the electro-magnet *E*, the disk makes one-quarter of a complete revolution, and is thus brought into a new position parallel to the track, in which case its edge is presented to the eye of the engineer, and the signal becomes practically invisible, thus denoting "safety."

A frame *G* is attached to the signal-post *C*, extending toward the track *A*, its extremity being near, and preferably somewhat above the top of the passing train. Upon the outer end of the frame *G* is mounted a short shaft *g*, parallel to the track (best seen in fig. 2), which carries projecting arms *H H*. The shaft *g* is mechanically connected with the upright shaft or spindle *d* by means of a horizontal shaft *I*, revolving in suitable bearings upon the frame *G*, and provided with bevel-gearing *i i*, so arranged that the horizontal shaft *g* revolves synchronously with the upright spindle *d*. The angular position of the arms *H H* upon the shaft *g* is such that when the disk *D* is in the position shown in fig. 1, denoting "danger" or "line blocked," the arm *H* will project horizontally beyond the extremity of the frame *G*, as shown in figs. 1 and 2; but when the disk is in the position indicated by the dotted lines, denoting "safety" or "line clear," the arms *H H* will assume a vertical position, as shown in dotted line in fig. 1. Thus it will be understood that the arms *H H* receive their motion from the signal-spindle *d*, and hence their position is dependent at all times upon the position of the signal-disk *D*, and must necessarily correspond therewith.

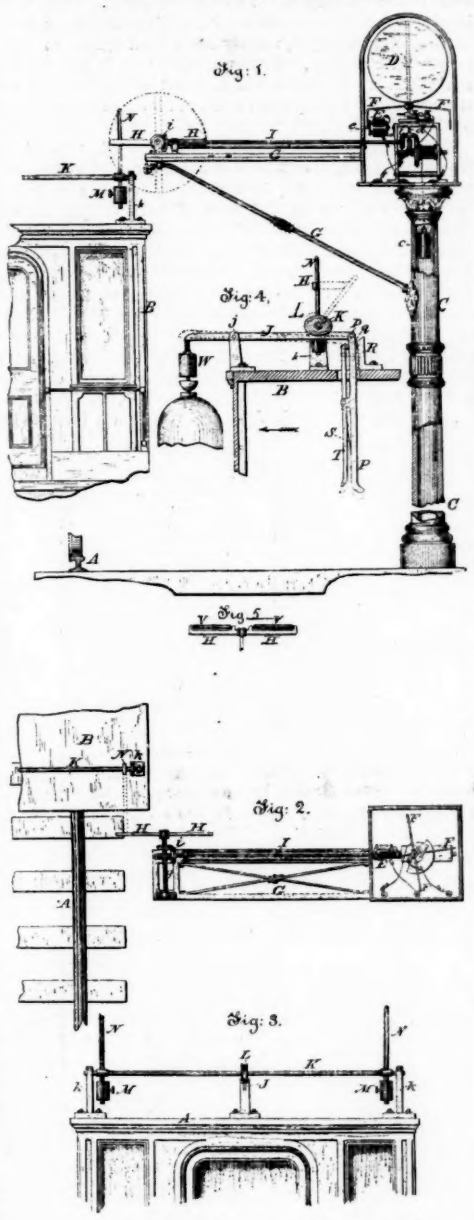
Upon the locomotive or car *B*, moving upon the track *A*, a suitable audible signal is placed, which may consist of a bell, gong, torpedo, or other similar means for producing sound, although the device illustrated in fig. 4 is preferred, which consists of a whistle *W* capable of being blown either by steam from the locomotive boiler or by compressed air from the atmospheric brake reservoir. This whistle is actuated by a lever *J*, pivoted at *j*, the short arm of which, when raised, opens a valve within the whistle in a well known manner.

Upon the cab of the locomotive *A*, or, if preferred, upon the roof of one of the cars of the train, is mounted a horizontal shaft *K*, turning in bearings upon suitable standards *k k*.

Upon the shaft *K* is rigidly fixed an eccentric or cam *L*, which bears against the free end of the lever *J*, as shown in figs. 3 and 4. The cam *L* is maintained in its normal position (which is that seen in fig. 4), by means of a weight or counter-balance *M*, which is placed upon the shorter extremity of an upright projecting arm *N*. The arm *N* is fixed at such a point upon the transverse axis *K* that its path, when the locomotive or train is in motion and passing the signal-post, intersects that of the rotary arm *H* upon the stationary frame *G*. The pendent handle *P* is pivoted at *p* to the free end of the whistle-lever *J*, and extends down through an aperture in the roof of the cab, so as to be within convenient reach of the engineer as he stands at his post of duty. A catch or dog *q* is fitted to slide in a slot passing transversely through the handle *P*, and engages with the teeth of a stationary rack *R*, being normally held in that position by the pressure of a spring *S* against a lever *T* attached to the handle *P*, as shown in fig. 4.

The mode of operation is as follows: If a locomotive or train *B*, moving upon the track *A*, is approaching, a visual signal which stands in a position indicating "danger" or "line blocked," and if, at the same time, from any cause the engineer of the train should fail to observe the signal or to bring his train to a stop before reaching it, then, upon passing the signal-post *A*, the upright arm *N* upon the locomotive or train will come in contact with the projecting arm *H* upon the signal-post and will be depressed thereby in the manner shown by the dotted lines in fig. 4, in which the train is assumed to be moving in the direction indicated by the arrow. The arm *N* should be but slightly overweighted by the counter-balance *M*, so that it may easily be depressed while passing beneath the arm *H* in either direction, after which it will immediately resume its normal or upright position by the action of gravity. The movement of the arm *H* will act through the shaft *K* upon the eccentric cam *L*, which will depress the arm of the lever *J*, and thereby cause the whistle *W* to sound, as hereinbefore explained. When the lever *J* has thus been depressed the dog *q* slips under one of the inclined teeth of the rack *R*, and is held there by the elastic force of the spring *S*. Hence the lever *J* remains depressed, and the whistle or other audible signal is continued in operation, notwithstanding the return to its normal upright position of the arm *N*. In this manner, and by means of the audible signal upon the locomotive, the engineer is infallibly warned that he has passed a visual signal while in a position indicating "danger."

In order to stop the action of the audible signal, it is only necessary for the engineer to grasp the pendent handle *P* and its attached lever *T* in such a manner as to compress the spring *S*, when the dog *q* will be withdrawn from the rack *R* and the lever *J* will be released.



POPE'S AUDIBLE RAILROAD SIGNAL.

The patent has been assigned to the Union Switch and Signal Company of Hartford, Conn.

Contributions.

The Conductor's Valve of the Westinghouse Brake.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you please suggest in your valuable paper that to make the air-brake more safe the conductor's valve should be placed in the body of the car (*not* in the *saloon*), and should be arranged so as to make quite a noise when used, even if a whistle has to be attached to it. Then the line running to it should be placed at the lower side of the clear-story within reach, and not against the *wall* of the car. There should also be a pipe running from the power cylinder of each car to the inside of the car, and a spring valve—like a conductor's valve—that can be used to "bleed" a car when the brakes do not go off, or when one creeps on. I have been on trains when brakes have been set and the engine working hard to pull the train, and when there was no other way to release the brakes excepting to stop and "bleed."

If the conductor's valve was placed in the car and had a whistle attached it would attract the attention of the trainmen and others if it was tampered with. If the line was placed at the lower side of the clear-story it would not be convenient for passengers to hang their umbrellas and other articles on. Conductors and brakemen and, in fact, all trainmen who run with the automatic air brakes, know that if valves were placed in the cars to "bleed" the brakes, that time, fuel and in many cases life could be saved. What will be done on some long trestle if the brakes should be applied and will not go off without bleeding? Some one will be obliged to take his chance and crawl on the trestle and under the cars to "bleed" them. My opinion is that 50 per cent. of the best engineers will lose the pressure in the drum if the hose pull apart or the conductor's valve should be opened, as in the case of the Hudson River Railroad disaster, and then the brakes or the passengers must be bled.

EXPERIENCE.

[The suggestion to attach a whistle to the conductor's valve and to place it in the car and not in the saloon seems to be an excellent one.—EDITOR RAILROAD GAZETTE.]

Performance of Wootten Engines.

BLAIRSVILLE, Pa., March 4, 1882.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Feb. 10 you publish in the "Scrap Heap" an article entitled "Burning Refuse Coal on the Reading Railroad."

It seems to me that this statement is not as good as it should be, when the two classes of locomotives are compared.

Now take and compare an ordinary ten-wheeled ("Gunboat") Reading locomotive with a "Consolidation engine" as follows:

	"Ten-wheeled."	"Consolidation."
Boiler	Straight.	Straight.
Fire-box	Sloping, 8 ft. 6 in. by 3 ft. 6 in.	Sloping, 8 ft. by 8 ft.
Cylinders	18 in. by 22 in.	20 in. by 24 in.
Dri.-wheels	46 in.	50½ in.
Tot. weight	33 tons.	52 tons.

You will notice that the ten-wheeled engine has a wide fire-box, compared with the general run of *ordinary* fire-boxes. This is on account of the fire-box covering the frame and being as wide as from outside to outside of frame. The fire-box rests on expansion links, fastened to the frame and outside shell of fire-box. The fire-box of "Consolidation" engines overhangs the driving-wheels, as you are no doubt aware, and rests on long expansion links fastened on top of the frame and to the ends of the fire-box.

To go back to the subject, any person acquainted with the Reading knows that all cars are reduced to an equivalent in four-wheeled cars. The train of a ten-wheeled engine always has been 125 four-wheeled cars. In the statement appended to the article referred to the ten-wheeled engine is allowed 6.654 trips and only 347.511 eight-wheeled cars, or 105 four-wheeled cars per trip, whilst their train always was 125 cars. The "Consolidation" engine is credited with 1,891 trips and 135,494 eight-wheeled cars, or 142 four-wheeled cars per trip.

How is it that the ten-wheeled engines are so far behind their usual load? I have seen the ten-wheeled engines haul 135 loaded four-wheeled cars, and they could still do it if proper care was taken of the engines and good coal furnished for their use.

This question can be partly explained as follows: When the Reading leased the North Penn Railroad and dealt out *nigger-head* coal to be burned on their engines the trains had to be cut down five eight-wheeled cars. What would affect a North Penn engine would do likewise with a Reading engine.

Nigger-head coal, at the price of *good* coal, goes a good piece towards making the cost of hauling, 5.6 cents per ton.

The ten-wheeled engine, according to value of fuel burned, used anywhere from 12¾ to 25½ tons of coal per round trip of 186 miles. Why do they only give the value, and not the tons, of the coal used?

Take the record of the "Consolidation" engines with Mr. Wootten's fire-box (patent dirt-burners), as follows:

The first consolidation engines bought from Baldwin Locomotive Works by the Reading Company were placed on the Bound Brook Division and hauled coal to Elizabethport, N. J. These engines burned *large stove coal* until Mr. Gowen issued an order that *they must burn dirt*. Then the fire was started with *stove coal* and a bed of *pea and dust* obtained. This called out another order, that no stove coal was to be used in firing up. This was no go; the dirt did not burn. Next, through the use of the regulator in the smoke-box door, and the intense heat in a fire-box eight feet square, the contraction was so great that the flues were drawn from the sheet, and thirty consolidation engines went to the shop to have the holes in the flue-sheet reamed out and copper ferules placed on the ends of the flues. And again, there was a larger proportion of the shifting engines, built at the Reading shop, with Mr. Wootten's patent fire-box, than of the old style, sent to the shops as "scorched" or "burned," as it is called. This was owing to this class of engines (dirt-burners) carrying their water badly. A Wootten dirt-burner is not a safe engine with anything less than three gauges of water.

Now take the steaming qualities of Engine No. 407, old style Reading engine, with cylinders 18 in. by 24 in., drivers 54 in., fire-box 9 ft. by 3 ft. 6 in., and weighing 34 tons, a ten-wheeled freight engine, passed around Manayunk slip reverse curve, with 70 eight-wheeled cars of grain, on Blue Line freight, without any trouble.

Engine No. 60 (same class as No. 407, but with Mr. Wootten's patent fire-box), following Blue Line, and hauling 60 loaded eight-wheeled cars, on Tamaqua freight and burning chestnut coal, stalled on this same curve, and was compelled to wait for steam.

I saw engine No. 407, on Blue Line, take down 90 loaded eight-wheeled cars at one trip.

Now let Mr. Wootten, or the Receiver's statement, explain why it is thusly, and why it is better to run a 52-ton

engine over the road, in place of a 34-ton engine? Also where does he charge his extra expenses on dirt-burners, such as drawing fires at end of every trip, flues pulled out by contraction, etc.? Also, is it necessary to prepare fuel or "refuse coal" by washing out the dirt, as they say: "The prolonged drought of the past season has seriously interfered with the *preparation* of this fuel, but arrangements are now being made by which a full supply for all of the engines referred to will be obtained."

I do not wish it to appear that I do not consider a slow rate of combustion to be the proper method, as well as the most economical method, of burning anthracite coal. But I do say that Mr. Wootten's fire-box was patented to be used as a dirt-burner, and that it does not burn dirt. Also, that Mr. Wootten's "refuse coal" has been by far the greater part composed of chestnut coal, and very clean coal at that.

Judging from the hearing you gave Mr. Eddy, Master Mechanic of the Boston & Albany Railroad, some two years since, on account of his all-powerful engines, and as I was much interested in the statements in regard to the same, I thought it might be interesting to many of your readers to have a few facts which came under my observation in regard to the much-heard-of (on one side) Wootten dirt-burners placed at their disposal. A READER.

English Railroad Signals.

[The following description of the signals used on British railroads, and of the methods of working them, which has been written by Mr. Charles R. Johnson, an English signal engineer from the celebrated works of Messrs. Saxby & Farmer, who is now in this country, will be of interest at the present time, when so many railroad managers are directing more attention than ever to their signals. Mr. Johnson's thorough and practical knowledge of the subject will give to what he writes, and to his advice, especial value to any companies who contemplate improving their methods of signaling. He can be reached by addressing him to the care of the *Railroad Gazette*:]

The following is a brief description of the most important points in the block and interlocking systems of working traffic on railroads as it has been applied in Great Britain and Ireland for many years. For the past seven years no new line has been allowed to be opened for passenger traffic without having these systems applied and duly inspected by a representative of the Board of Trade. This description may be interesting from the fact that block working in this country is by no means the same as it is in England, and interlocking is almost unknown. Many people confound the system of interlocking points and signals with that of block working, whereas they are quite distinct, and can be worked the one without the other. A description will be found later of the manner in which the two systems have been recently mechanically united.

The term "block system" means that the track is divided into certain "blocks" or "sections," at each end of which is placed a man with power to prevent engines or trains entering such sections, and that no more than one train or engine shall be allowed on the same section on the same line of rails at the same time.

There are three modes of working the block signals, and they are termed, respectively, the "positive," "affirmative" and "permissive."

The positive system is that under which the instruments are blocked only during the time the track is obstructed. The affirmative system is that under which the instruments are blocked in their normal position and are changed to "clear," only to give permission for a train to enter the section.

The "permissive" system is really no block system at all, and its introduction has always been a fruitful source of accidents. Under it two or more trains traveling in the same direction are allowed in the same section on the same rails at the same time, the second and other trains being cautioned by signalmen that obstruction may be found ahead of them. Each locomotive runner is thus thrown upon his own responsibility and each may act differently, one running at moderate speed and another proceeding as usual. The permissive system is also conducive to greater delay by reducing speed than would be experienced by working absolute block with sections arranged to suit the traffic.

The "positive" system is that generally used, and is found to be the best.

The interlocking system is that by which switches and signals are so worked as to insure that no signals conflicting with the position of the switches can be given, and that before signals can be given for any track, the switches on and in connection with that track shall be set and locked in their proper positions, and that after the signal has been given the switches cannot be removed without resetting the signal to "danger."

It has been remarked that accidents happen when the block system is in use, and it must be acknowledged that such is the case; but only to a very limited extent; and it is certain that the great majority, if not all, of the accidents caused by collisions in this country would be avoided by the introduction of block working. I would refer those who doubt this to the English Board of Trade returns of accidents on railroads.

Although the block and interlocking systems are quite distinct and can be used the one without the other, they are almost invariably worked together by the same operator; and in the following remarks I shall always refer to them as being under the control of one man.

The elevated cabin is the first requisite, and in choosing the site for it care should be taken to so place it that it may be utilized to work and govern as many switches connected with the main track as possible, or in such positions as may be most convenient for shifting operations. It is found that cabins elevated to a great height are rather a detriment to speedy working than otherwise, for although a switchman may, in clear weather, be able to see trains approaching from a greater distance, he cannot so well see the yard at his feet, in which lie the switches he is called upon to operate; nor can he be communicated with so readily by the men, who continually require to instruct him as to the positions cars are to take up. On the whole, cabins elevated from 8 to 10 ft. above the rail level are much preferred to those higher, except in cases where a bridge or other obstacle obstructs the view of the track. Level crossings, of which there are so many in this country, at which gatemen are employed, usually form good points at which to erect block cabins, because the man who is necessary to control the traffic across the railroad can as readily and much more effectually do it when he also controls the traffic on the railroad.

The cabins should be constructed with a view to giving the switchmen as good a view of the track and switches as possible, and not, as is quite usual here, in such a way that he can see only with difficulty. I have frequently seen cabins elevated to a great height for the purpose of obtaining a good sight of the track, and that object has been quite defeated through the space occupied by glass being so small. The sashes should reach from about 12 in. above the floor line to a height above the switchman's line of vision, and have no more timber in mountings or corner posts than is absolutely necessary. The cabins should be built so as to afford ample space for the operator, and be properly heated and ventilated.

The block working is done by means of instruments specially made for the transmission of block signals, and they are used only for this purpose, speaking instruments being provided where they are considered necessary. Different companies have slightly different codes of working; but they are all simple, and can be readily learned in a few hours. A bell-signal diagram and instructions for working are placed in the cabins. Several types of instruments are used; but there is not much practical difference in their working. I will describe the instruments and system of Tyer, which are extensively used.

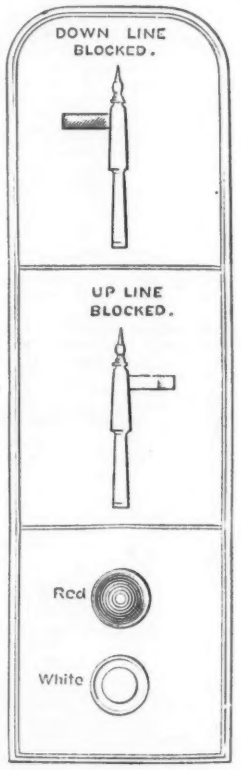


Fig. 1.

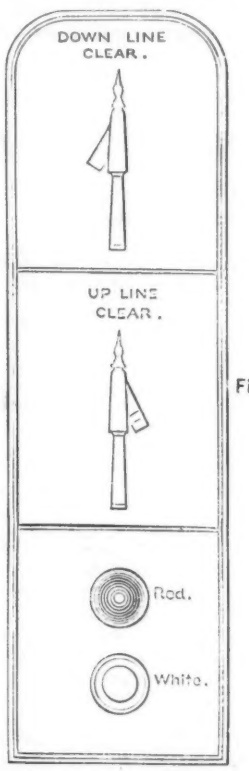


Fig. 2.

There are two instruments exactly similar required for each cabin, figs. 1 and 2. The dial of each instrument is divided into two parts, one part being for the up line and the other for the down. The instrument has two miniature semaphore arms, or sometimes two needle points, the upper one colored red and the lower one white. The instrument is also furnished with two keys, or plungers, placed one above the other, the upper one colored red and the lower one white. These are to indicate the needful block signals by moving the white semaphore or sending portion of the dial. Similar movements are made on the upper red semaphore or receiving portion of the dial, at the distant section, and with every movement a gong or bell rings.

A plunger or ringing key, similar to the key of an electric bell, colored black, is provided and fixed near to the instrument, by which the signalman is enabled to give all call signals on the gong or bell at the distant station without interfering with the keys or indicators of his signaling instrument.

The red arm shows the last signal *received* at the station; the white arm the last signal *sent* from the station, the semaphore working up and down after the manner of outside signals.

Each station is furnished with a bell for the up track and a gong for the down track. A signal once given remains fixed until the next signal is sent, and can therefore be referred to.

In working the instrument it is only necessary to employ the particular plunger mentioned in the diagram of instructions to indicate the signal required to be sent. For example, to indicate at the distant station "line blocked" the plunger colored red must be pressed and the white semaphore on the dial will be raised to the danger position, and a similar signal will be exhibited by the red semaphore on the dial at the distant signal cabin. Again, "line clear" will be exhibited by pressing in the plunger colored white, when the white semaphore will be altered to the "all right" position and a similar signal exhibited by the red semaphore at the other signal cabin. Whenever the red semaphore is moved the bell or gong will sound.

Signals given on the red key block the line in the rear and signals given on the white key clear the line in the rear. Signals given on the black or separate ringing key influence only the bell or gong at the distant station.

The following is a practical illustration of the working between three station cabins, respectively *A*, *B* and *C*. *A* passenger train is supposed to be leaving *A* and traveling in the direction of *B* and *C*. *A* having previously obtained "line clear" from *B*, he now gives "train on line" to *B* by four beats on the black key, which *B* acknowledges by pressing his red key and thus placing the red semaphore in cabin *A* at danger. *B* now gives the "Be ready for passenger train" signal to *C*, who is thus informed of the near approach of a train, and knowing its description can make the necessary preparations for it. When the train passes *B* he gives "train on line" to *C* (if he has obtained "line clear" from *C*), and "line clear" to *A*.

It will thus be seen that the working of the instrument is very simple.

Speaking instruments are usually placed in the cabins in order to give communication with directing offices of the road.

The block signal instruments and bells are exclusively for the signaling of trains and should not under any circumstances be used for any other purpose than block working, in strict accordance with the regulations laid down, and they should only be used by the signalmen specially appointed for the duty.

The signaling of trains on the block telegraph system does not in any way dispense with the use of starting, home, distant or fog signals, whenever and wherever such signals may be requisite to protect obstructions on the railroad.

The object of the system of electric train signaling is to indicate whether a block section is occupied with a train, or clear of train or other obstructions, and thus to prevent more than one train or engine being between any two signal stations on the same line at the same time. This is accomplished by not allowing any train or engine to leave a signal station until the previous train or engine has been signaled as having left the signaling station next in advance, and "line clear" is indicated on the block instrument.

In signal cabins that are closed during the night or on Sundays, arrangements are made by which the circuit is switched through to the signal cabins on each side. Thus, when block signaling is worked between *A*, *B* and *C*, and it is desired at certain times to close *B*, a switching arrangement is provided which at once connects *A* to *C*, and leaves *B* free to be closed.

I will here give a brief description of the important invention of Mr. Hodgson, the General Manager of Messrs. Saxby & Farmer, the well-known railway signal engineers of London, which mechanically unites the working of the block and interlocking systems, and effectually prevents the hitherto existing danger of contradiction between block telegraph signals transmitted from one station to another, and the outdoor signals exhibited to the enginemen.

By this invention, a full description of which is given in the *Railroad Gazette* of Feb. 10 of this year, the levers working points and signals are interlocked with the handles working the telegraph instruments, and in this manner it is impossible to lower signals for trains to proceed while the section into which it is going is blocked.

The use of this invention makes it compulsory that points and out-door signals be in proper position before "line clear" can be given for an expected train; that no movement of switches can be made for shunting or giving access to a line signaled as clear, the switches remaining firmly locked until the train has passed out of the block section; that, having once sent "line clear" on the block instrument, and the permission to send a train having been accepted and acted upon by the signalman at the next station, it is impossible to transmit a second message of "line clear" until the train has passed and itself caused the release of the block instrument; that the outdoor starting signal shall be set to "danger" behind every train, and that it cannot be given to permit entrance into a block section without the concurrent action of the signalmen at both ends of the section.

This system has been at work for some time on some of the southern lines in England and is still being introduced; it is also extensively used in Belgium. Wherever it has been used it has given great satisfaction. Colonel Yolland, one of the inspectors of the Board of Trade, has reported most favorably upon its actual working.

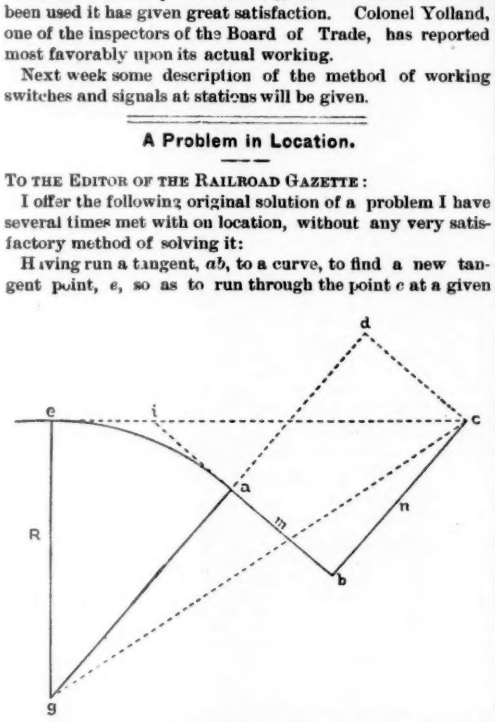
Next week some description of the method of working switches and signals at stations will be given.

A Problem in Location.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I offer the following original solution of a problem I have several times met with on location, without any very satisfactory method of solving it:

Having run a tangent, *ab*, to a curve, to find a new tangent point, *e*, so as to run through the point *c* at a given



perpendicular distance from *b*. From *c* draw a tangent, *ce*, to the curve. Produce *ga* to *d*, making $ad = bc = n$. Join $cd = ab = m$. Then the required angle is $bic = egd$. By trigonometry,

$$\tan.\ cgd = \frac{cd}{gd} = \frac{m}{R+n},$$

$$cg = \frac{m}{\sin.\ cgd},$$

$$\cos.\ cge = \frac{eg}{cg} = \frac{R \sin.\ cgd}{m},$$

and $cge - cgd = egd$.

Example.—Let $R = 1{,}432.7$, the radius of a 4° curve; $m = 1{,}500$, and $n = 500$.

For angle *cgd* we have,

$m = 1{,}500$	log. = 3.176091
$R + n = 1{,}932.7$	log. = 3.286164
$cgd = 37.° 49'$	log. tan. = 9.888927

For angle *cge*,

$R = 1{,}432.7$	log. = 3.156155
sin. 37.° 49′	log. = 9.787557
$m = 1{,}500$	log. comp. = 6.823909
$cge = 54.° 09'$	log. cos. = 9.767621

and $54.° 09' - 37.° 49.' = 16.° 20.' = 16{,}33°$ and $\frac{16.33°}{4} =$ 408 + feet to be taken from the curve.

I. S. DUNNING, C. E.

Government Recommendations of the Signal Systems in France.

The new French Minister of Public Works has recently addressed a circular to the railroad companies of the country, which we translate as follows:

At the close of the last investigation relative to the means of preventing railroad accidents, a ministerial circular dated Sept. 13, 1880, invited the companies to apply the block system over such lines as are traversed, at certain hours of the day, by as many as five trains an hour in the same direction, and at junction points and short curves.

The same circular directed the companies to take measures to equip the lines gradually with the so-called "German" electric bells on those single-track sections where there are more than six trains daily in each direction.

Since that time numerous accidents have occurred, and have shown the necessity of repeating these directions and making them more complete. One of these accidents especially, and that the most serious one, took place on a great double-track line equipped with the apparatus of the "Tyer block system," thus proving demonstratively that a system of blocks worked by the electric telegraph can give absolute guarantee of safety only when it is applied in all its rigor and by the aid of perfected apparatus which can leave no place for any chance of error or forgetfulness on the part of the men charged with working it.

After this accident my predecessor, after having repeated (in a dispatch dated Nov. 2, 1881) the directions of the circular of Sept. 14, 1880, advised the companies of the development and the improvements which should be made in the principal safety apparatus.

On my part, I have closely examined the questions which involve the safety of trains, and I have attentively considered the companies' answers to the aforesaid circulars of Sept. 13, 1880, and Nov. 2, 1881.

In this examination I have become convinced that the measures heretofore taken or projected by the companies were unsufficient either on double-track or single-track roads to guarantee safety completely and satisfy the prescriptions of articles 27, 31 and 35 of the Regulating Ordinance of Nov. 15, 1846.

I.—DOUBLE-TRACK ROADS.

At present, on double-track roads, the block system is not absolute. On most of our great lines a modified system, called the permissive block, has been adopted. The result is that, in certain cases and in consideration of certain precautions prescribed by the regulations, one or several successive trains are, exceptionally, admitted upon one blocked section. This is a defective policy and may occasion accidents.

On the other hand, the Tyer apparatus, with or without the Jousselin indicator, by whose aid some companies try to realize the block system, is of delicate construction and requires constant watching. Moreover, the working of it presupposes the constant presence and sustained attention of part of the employés.

The same imperfections are found, though in a less degree, in the Regnault indicators, which some companies have adopted.

Moreover, the Tyer and Regnault apparatus have this inconvenience, that they simply furnish the signal men at the ends of the block sections with the signs which inform them how to set the optical signals addressed to the engiemen. The optical signals being thus entirely independent of the electric signals, there is risk, in repeating the latter signals, of forgetfulness or errors, whose consequences may be disastrous.

In order to remedy a part of these inconveniences, the companies are trying to improve the Tyer and Regnault apparatus in such a way as to connect the optical signals with electric signals, and to record automatically the signals which have been transmitted from the corresponding station; but the solution of this problem is still uncertain. Moreover, it necessitates tentative measures, experiments and delays, while there is no time to lose and it is necessary to act.

To-day the *absolute* block system should be, in general, the rule in working double-track roads, and, in order to produce all its useful effects, it should be realized by the aid of perfected apparatus, joining to solidity of construction great simplicity in operation, and presenting the following characteristic conditions: Immediate and complete solidarity of the electric signals and the optical signals, so that the latter transmits the former automatically; mechanical locking of the optical signals at danger, so that they cannot then be changed and set to line clear from a distance and by an electric unlocking, except by the next station in the direction the train is running; finally, if the electricity fails to work, the maintenance of all the signals at danger.

These conditions seem to be filled in a satisfactory manner by the electro-semaphores of Lartigue, Tesse and Prudhomme, which are working regularly in some much crowded sections of our different railroad systems.

I think, therefore, that it is my duty to invite you to establish, with the least delay possible, *on the principal trunks of lines with a great many trains*, apparatus, uniting all the indications indicated above.

THE SINGLE-TRACK ROADS.

The single-track roads are those on which collisions may have the most serious consequences.

Whatever the method of working these lines, I consider it indispensable to provide them all, without distinction (excepting, however, those on which the trains are run by a single locomotive) with safety apparatus adding new guarantees to those which the actual regulations of the company afford.

The so-called *German* electric bells, two of which have been applied in France, the *Siemens system*, worked by an induction current, and the *Leopolder system*, known also as the *Austrian system*, worked by a continuous current, constitute a most valuable auxiliary. They have been in general use in Germany for more than 20 years, and the French companies, which have provided them on various lines, have had cause to be satisfied with their action; already they have prevented serious accidents on our railroads.

The principal object of these bells, as you know, is to announce at the next station, and at all the intermediate signal boxes, the *approach* and *direction* of the trains on the single track. However, they can be utilized for transmitting alarm signals to the trackmen stationed along the line, especially the signal to stop all trains. From both these points of view they are capable of rendering invaluable services; they aid the memory of the station masters, announce the approaching arrival of trains at all the level crossings; finally, they are an extreme resort in the case of imminent danger.

This being so, I think that all restrictions heretofore permitted in the use of electric bells should be removed, and that it is desirable to provide, progressively, *all* the single-track roads, whatever their traffic may be, with this apparatus, recommending particularly to you the Leopolder system, which has the advantage of permitting the trackmen to give the alarm signal in case of danger.

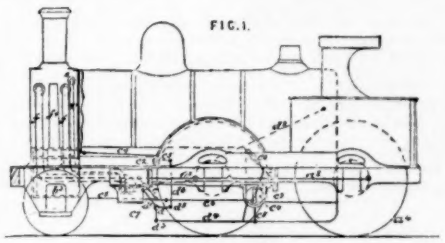
I invite you, gentlemen, to take measures to this effect without delay.

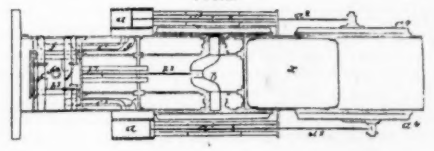
I do not need to insist on the importance of the above instructions; you will certainly comprehend the thought that has dictated them. Without attributing an exclusive preponderance to electricity in the working of our railroads, we must grant it the large part which modern science already assigns it, and use it as a powerful auxiliary, eminently fit to second the intelligent action of man, to save it from its defects and forgetfulness, and to repair, so far as possible, in some cases, the errors which it might commit.

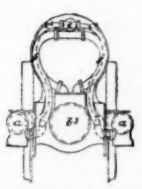
Steel Boiler Plates, Metal Ties and the Webb Locomotive on the London & Northwestern Railway.

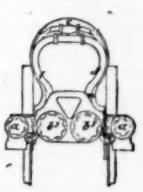
With the following abstract of an address by the Locomotive Superintendent of the London & Northwestern Railway, copied from *Engineering*, we publish engravings of the locomotive referred to, copied from Mr. Webb's patent specifications:

Speaking at the annual dinner of the Manchester Association of Employers' Foremen and Draughtsmen, held at Manchester on Saturday, Mr. F. W. Webb, of Crewe, the President, spoke at length on matters connected with the management of railways. Alluding to the increased use of steel, he claimed that the London & Northwestern Railway Company had been the first great firm to recognize the importance of the improvements of Bessemer and Siemens. Steel had been substituted in nearly every portion of the locomotive which formerly was made of iron. At present the company had 1,679 engines with steel boilers, and so far they had every reason to be satisfied with the result. The company were also one of the first to use Bessemer steel plates for their passenger vessels. They now had four first-class steamers constructed of this material running regularly between Holyhead and Ireland, and from the examination made from time to time of the hulls of these vessels, it was found that the material admirably answered its purpose. The plates had been manufactured under his superintendence. They had the misfortune last year to get one of their steel vessels on a sunken rock at the entrance to Carlingford Loch. Had it been built of iron he felt certain it would have become a total wreck. As it was, 90 ft. of her keel passed over the sunken rock, which bulged it in some places to the extent of 5 in. or 6 in., but there was not a single crack in the plates, and no water got into the vessel. Notwithstanding improvements in material, the quantity of rails annually required for repairs and renewals on the London & Northwestern Railway was now 20,000 tons. For every mile run, the actual loss of rails was about one-third of a pound of steel, so that on the London & Northwestern Railway 15 cwt. of steel disappeared from the rails every hour of the day. The collective wear and tear of locomotives on the London & Northwestern Railway necessitated a new engine being put into the traffic every five working days. The question of the future permanent way was a very important one, and one that sooner or later would have to be dealt with, as with the immense consumption of wooden sleepers going on all over the world, we would be sure in a short time to find ourselves suddenly in the throes of a timber famine. They had tried to solve the problem themselves on the London & Northwestern Railway, by introducing a sleeper made of iron or steel, the chairs themselves being made of steel, worked up from the crop-ends of rails. Most of the schemes which had been adopted had failed for want of elasticity, from the fact that bolts and nuts had been used to a large extent. In the plan, on which several miles had been laid down on the London & Northwestern Railway, they had tried to avoid all these defects; and certainly they had every promise of success. Between the surface of the chair and the liner, and also between the liner and the sleeper, a sheet of bituminized brown paper was placed before the chairs were riveted by hydraulic power to the sleeper itself. This was intended to obviate the grinding away of the metal surfaces. The wooden key had been retained, and placing it outside, as they did, they got a most perfect cushion between the rail and the chair, and as far as they had tried it, in consequence of the key swelling into the hollow made in the chair bracket in stamping up, they had not had a single instance in which the key had worked back. If iron or steel could be introduced successfully for sleepers, the world would be able to find for iron and steel industries work equal in amount to that now required for the making of rails. The constantly increasing weights of passenger trains, and the question of how to provide more powerful locomotives than existing ones without having more weight upon a pair of wheels than a road will carry with economy, was a problem yet to be solved, as also was the question of further economy in the working of the locomotive. Thinking the compound principle, if simply carried out, would do something toward his end, he had designed a locomotive engine in accordance therewith. The engine had two pairs of driving wheels, one pair being driven by the high-pressure cylinders, and the second pair by one low-pressure cylinder, the use of coupling rods, which gave trouble at high speeds, being abandoned. He had been enabled to do this without complicating things, thanks to the valve motion brought out by Mr. David Joy. This system did away with the eccentrics, not that the old eccentrics had been a bad contrivance, but on the narrow gauge there was no room for wide bearings with them, so as to allow the engine to run without hot brasses. He had called the engine "Experiment," but from her performance he thought it was an experiment they would repeat. Last week he had the engine out for its first run in the traffic, starting from Crewe as the assisting engine with a very heavy train to Euston. Next morning he ran the engine with the 7:15 Irish mail from Euston to Holyhead, arriving there at 1:40; and leaving again at three o'clock with the boat express.









WEBB'S COMPOUND LOCOMOTIVE.

The engine maintained its steam to the point of blowing off the whole of the journey, and only consumed 23.54 lbs. of coal per mile for the whole trip, including that for raising steam. Seeing that the engine was new and the men strange to one of this construction, he thought it showed that something might be done in still further economizing the fuel in locomotives. The fact that a new compound engine ran during its first round trip upwards of 528 miles, and was as cool at the end of its journey as when it started, promised well for the future.

Mr. Webb said further that another problem which had been before them for the last few years was the question of continuous brakes. There were many inventions in the field,

but out of over a thougand patents for brakes which he had examined, one taken out by Messrs. Swinburne and Laming in 1865 had the germ of a good many of them. Most of the leading engineers had been against the automatic action, firmly believing that these machines would be more liable to cause mischief than to help in avoiding it; and this belief had been fully verified by more than one unfortunate accident. In an appendix to the report of Colonel Yolland on the Blackburn accident it was stated very clearly: "It is essential the defects in the automatic brake to which Colonel Yolland alludes should be provided against, and every precaution taken to insure the brake acting only when required." So far as the principal English railways were concerned they were arriving at a solution of the difficulty, and they had to thank, in some degree, Messrs. Gresham and Craven, who had rendered considerable assistance and who had made the manufacture of the necessary details a specialty.

Lubrication.

[Abstract of a note on "Lubrication," by Thomas Farmer, F.C.S., read before the Liverpool Association of Science and Arts.]

In a steam engine, where many parts are moving, a large amount of friction is produced, which tends to stop those parts, and it would ultimately do it, were they not continually re-supplied with fresh motion obtained by the burning of fuel. Hence it is apparent to everyone, that the engine has not only to overcome the resistance of the work to be done, but also the resistance offered by its own parts. In other words, the amount of heat manifested in friction is the amount of extra heat that will have to be generated under the boiler, and the extra cost of working will be the cost of the fuel necessary to produce the heat. From the experiments of Morin, we find that the friction of a cast-iron shaft upon a dry bell-metal bearing amounts to 0.2 of the transmitted power, while with a wrought-iron shaft the friction is more than 0.25; therefore, if such shafts were dry and unlubricated one-fifth and one-fourth respectively of the total fuel cost would be wasted in overcoming friction. By careful lubrication of the same shafts, the loss may be reduced to 0.065 in the one case, and 0.089 in the other. Hence the importance of a good lubricant. One of the next essential points is that it shall be properly distributed over the surface on which it is required, that just sufficient shall be used and all waste avoided; otherwise, what would have to be spent in overcoming friction will have to be spent in buying oil. Putting aside the commoner characteristics of a good oil, such as the absence of acidity, either natural or artificial, and the absence of gumminess, one of the most commonly believed ideas is, that an oil of high specific gravity is the best for lubricating purposes. Although this may be true in certain cases, yet from observations and experiments made over a long period I have found that they are not always the best, and that the point upon which we must rely is the *viscosity*. To test this I have found a French pourette graduated into 100 c.c. to be most useful. The pourette is fitted on a stand and filled with the oil to be tested; after allowing all bubbles of the air to separate, it is permitted to run through, and the time it takes to do so is carefully noted. At the close of the experiments it will be found that the viscosities are directly proportional to the time taken: thus if a mineral oil takes 15 seconds and rapeseed oil 45 seconds, the viscosity of rapeseed oil is three times that of the mineral. The temperature may be either 60° or 90° Fahr, but the latter is preferable, as the oil may be subjected to that temperature when in use. The question next arises, How is this viscosity basis to be applied? If an oil of very high viscosity, such as castor or rapeseed, were used to lubricate an engine of low horse-power, we should in all probability find that, instead of reducing the friction to a minimum, it would itself become a source of resistance and increase the evil. And conversely, if an oil of very low viscosity were used to lubricate an engine of high horse-power, we shall find that the friction would be but slightly, if at all, reduced. Hence, when we come to look at extreme cases, we see that there exists a very marked connection between viscosity and horse-power. A high viscosity is not suitable for a low horse-power, and, conversely, a low viscosity is not suitable for a high horse-power. And just as the case holds for these extremes, so does it hold for every point between them; the viscosity must always keep parallel to the horse-power. The same rule holds with respect to machinery, and to insure perfect lubrication the viscosity must gradually increase with the ponderousness. From this it is clear that economical lubrication does not consist in procuring and using the thickest oil possible, but the oil which is best adapted to the nature of the machinery, and scientific mixing likewise consists in compounding oils most clearly adapted to the purpose for which they are to be used. It is rather difficult to say what oils are most suitable for mixing purposes, but it may be stated with a tolerable degree of accuracy, that the best method is to take a basis of American or Scotch mineral oil 885° to 903° sp. gr. and add either olive, lard, rapeseed, or castor, to "work up" the viscosity. Olive and lard, when mixed with mineral in proportions 10, 20, 25, and so on up to 75 per cent., are about equal in value as lubricants of the lighter class of machinery. Rapeseed oil in like proportions is valuable where the machinery is of a heavier kind, or where the lubricant has to be used throughout a works in which the machines vary much; but in such a case it will be better to divide them into classes and use a special oil for each class. Castor-oil mixed with mineral in varying proportions may be used in the case of the most ponderous machinery. In mixing castor I noticed a remarkable and interesting phenomenon. On adding about 25 per cent. to an American neutral oil of a reddish color, I was surprised to find, after the lapse of a few hours, that the oils had separated, and that the castor, originally quite clear, had taken down with it nearly the whole of the coloring matter, leaving the mineral oil a beautiful pale, straw-colored liquid. I further found that the successive additions of fresh castor still further removed a coloring matter, until both castor and mineral were of the same tint. Continued experiments showed that if the castor were first mixed with an equal bulk of olive or rapeseed oil, and then added to the mineral, the mixture was of a permanent character.

In conclusion, I have found that a properly-mixed oil is in every case far preferable for general use to either mineral, olive, lard, castor or other oil used singly; and it may be added that no oil is more suitable as a basis for mixing than mineral, and that cold-mixed oils are better than those mixed at a temperature over 100 degrees.

Steel for Tires and Axles.

[Paper by Benjamin Baker, M. Inst. C. E., published in vol. lxvii. of the Minutes of the Proceedings of the Institution of Civil Engineers.]

The present experience with reference to the use of steel in tires and axles is so great that it might not unreasonably have been assumed that, by common consent, engineers and manufacturers would have arrived at certain definite qualities for these purposes respectively. To ascertain whether this was so the author recently obtained half a dozen pairs of tires and axles from as many of the leading makers at home and abroad, and submitted the same to the tests briefly detailed hereafter. No particular mode of manufacture was specified, nor were any conditions imposed as to price. The results were startling and unsatisfactory. Not only was there no uniformity in the quality of steel supplied by the several makers, but even the two tires of the same maker, as a rule, differed widely in behavior under test. Thus the tensile strength of the steel in the twelve tires ranged from 32.25 tons to 49.5 tons per square inch, and the extension from 5 per cent. to 25 per cent., whilst under the "drop-test" one tire might fail at the second blow of a weight of one ton falling 10 ft., and the next only do so at the twelfth blow from the increased height of 30 ft., the respective bendings before fracture varying from no less than 9-16 in. to 28 in. in the 3 ft. tire. Similarly the tensile strength of the steel in the axles ranged from 27.35 to 40.7 tons per square inch, the extension from 17.6 per cent. to 23 per cent., and the number of blows sustained before fracture from 3 to 35. It will be seen hereafter that a high rate of elongation affords no guarantee that a tire or axle will behave well under the drop-test, and probably no efficient substitute could be found for the rough and ready test of endurance afforded by the bending and straightening blows of a weight of 1 ton falling 20 or 30 ft.

TABLE I.

	Approximate elastic resistance to collapse.	Permanent set under 4 tons.	Ultimate tensile strength.	Percentage of elongation in length of 5 in.	Extent of Bending under Falling Weight. After third blow.	After fifth blow.	After eighth blow.
		Inches.	Tons per sq. in.	Per cent.	Inches.	Inches.	Inches.
a_1	38 tons	0.05	49.50	14.0	2¾	6⅞	13⅞
a_2	Not taken	.....	49.48	14.0	2¾	6⅞	13⅞
b_1	38 tons	0.05	46.43	18.6	3	7 9-16	15⅝
b_2	Not taken	.....	40.9	23.6	3	7⅛	15⅝
c_1	"	.....	44.21	8.0	3 9-16	Broke at 4th	.....
c_2	36 tons	0.07	42.48	5.0	4⅛	Broke	.....
d_1	Not taken	.....	42.51	19.6	Broke	.....	.....
d_2	33 tons	0.18	37.36	5.8	Broke at 2d	.....	.....
e_1	36 "	0.05	38.85	24.4	3¾	Broke	.....
e_2	Not taken	.....	38.01	25.0	4	10⅛	20⅝
f_1	"	.....	34.67	14.5	5 5-16	Broke.	.....
f_2	29 tons	0.60	32.25	12.0	5⅛	11⅞	24⅝

TABLE II.

NOTE.—The moment of resistance of the tire being 5, the bending moment 5 W, and the average elastic tensile resistance of the steel 22 tons, the elastic resistance to collapse might have been wrongly calculated to be 22 tons also; but, for reasons set forth in the author's paper on "The Practical Strength of Beams," it would have been more correctly assumed at about 22 tons × 1.7 = 37 tons.

	Diameter of axle.	Ultimate tensile strength.	Percentage of elongation in length of 5 in.	Extent of Bending under Falling Weight. 10 ft.	20 ft.	No. of blows causing failure.
	Inches.	Tons per sq. in.	Per cent.		Inches. Inches.	
a	4	27.79	22.0	2⅞	4¾ to 5⅝	35
b	4¼	40.7	20.6	1⅝	3⅜	8
c	4⅛	36.85	22.0	2½	Broke at 15 ft.	4
d	4 1-16	27.35	23.0	3	4⅝ to 5⅜	34
e	4 1-16	31.15	19.4	2⅞	4⅜	14
f	4⅛	32.34	17.6	2⅜	3⅝	6

TIRES.

The tests applied were:

(1) A steady bending pressure, to ascertain the elastic resistance of the tire to collapse.

(2) Successive blows from a weight of 1 ton falling 5, 10, 15, 20, 25 and 30 ft., to determine the endurance of the tire under shocks and blows.

(3) A steady pulling stress to ascertain the ultimate tensile strength and elongation of samples of steel cut from the tires.

The tests were conducted in all instances either by the author, or by Professor Kennedy, M. Inst. C. E. The tires were of ordinary cross section, and weighed on the average 427 lbs. each. The two samples of the several makers are referred to as a_1 and a_2, b_1 and b_2, etc., in Table I.

AXLES.

The tests applied were:

(1) Successive bending and straightening blows from a weight of 1 ton falling 5, 10, 15 and 20 ft., and continued at the latter height until failure occurred. The axles were placed on solid bearings 3 ft. apart, and were turned half round after each blow.

(2) A steady pulling stress to ascertain the ultimate tensile strength and elongation of samples of steel cut from the axles.

The axles were nominally 4 in. in diameter, but ranged from that figure to nearly 4¼ in. The makers are referred to under the same letters as in Table I.

Comparing the Table II. with Table I., the following conclusions would appear to result:

(1) Maker *a* adopted for his tires a steel of high tensile resistance, uniform in quality, with a medium amount of elongation, and capable of standing several blows from 1 ton weight falling from the full height of 30 ft. For his axles he used very mild steel, having 43 per cent. less tensile resistance and 50 per cent. more elongation than the tire steel, and of great endurance under the drop-test.

(2) Maker *b* apparently preferred a medium quality of steel for both tires and axles, and, as a consequence, his tires were not so hard and strong as the *a* tires, and presumably not so durable, whilst his axles were much harder, and failed with comparatively few blows under the drop-test.

(3) Maker *c* supplied a couple of moderately hard tires, but the steel had a dangerously low rate of elongation, and failure quickly resulted under the drop-test. The axle was somewhat softer than the tires, and had a satisfactory rate of elongation, but signally failed to withstand the shock of the falling weight.

(4) Maker *d* used a fairly hard but very untrustworthy quality of steel for his tires, as evidenced by the wide difference in the ultimate strength and elongation of the two tires, and by the snapping of both with a slight blow under the drop-test. His axle, on the other hand, was of mild steel of suitable tensile strength and elongation, and behaved exceptionally well under the drop-test.

(5) Maker *e*, though his tire steel was of uniform tensile strength and elongation, did not succeed in securing uniformity of quality. Although the steel was too soft for good wearing purposes, and had a high rate of elongation, one of the tires failed with half the number of blows that the second and several other much harder tires sustained. The axle was somewhat hard, and suffered correspondingly under the drop-test.

(6) Maker *f*, like maker *b*, apparently used the same steel for both tires and axles, but of a much milder quality. Notwithstanding its softness, the steel did not prove uniform and trustworthy, as the axle broke at the sixth blow with a bending of 3⅝ in., whilst one tire bent 27⅛ in. before fracture and the other only 8⅝ in.

It may be interesting to remark that samples of steel from axles supplied in 1868 by maker *a*, and in 1862 by maker *b*, were tested by Herr A. Wöhler in his celebrated series of experiments on the "fatigue of metals."* At the dates named it may be inferred that the former maker was in the habit of supplying steel for axles having a tensile strength of from 26 to 29 tons per square inch with a rate of elongation of from 16 to 20 per cent., and the latter maker steel having what would now be considered in the case of axles the dangerously high tensile resistance of from 48 to 50 tons with an elongation of from 11 to 18 per cent. The conclusion the author draws from his experiments is, that it would be imprudent on the part of an engineer to leave the quality of steel either for tires or axles to the discretion of a manufacturer, or to forego the most rigid system of inspection. An occasional test is of little use, because the most inferior materials may at times accidentally produce a good result; but to insure a good result and perfect uniformity in quality, the best materials and the greatest care in manufacture are absolutely essential. The tabular results show that a sample of steel may be cut from a tire or axle and be tested with perfectly satisfactory results as regards tensile strength and elongation, and yet that the tire as a whole may fail under moderate shocks, either on account of the steel being inferior in some respect which those tests do not detect, or from its not being uniform in quality throughout. Similarly as regards the axles. Mildness, great elongation and an ability to withstand the "temper" test do not always insure the steel being able to withstand the shocks and jars of traffic. Half-a-dozen specimens may be cut for testing from a given axle, and yet some weak spot in it escape notice. It has been frequently proved, both by chemical analysis and by physical tests, that a bad ingot, or a steel rail rolled from it, differs widely in composition and strength from point to point, and the same holds good with a bad steel axle. A severe blow, either under the drop-test or in actual working, tries every part of the tire or axle, and finds out the weak spot, if there be one, whereas by almost any other test there would be a chance of the fault remaining undetected. Assuming the steel to be of good materials and to be uniform in quality, it remains to be decided what degree of hardness is most desirable in the case of tires and axles. Experience has proved that steel, having a tensile strength as high as 50 tons per square inch, is quite trustworthy for use in tires in ordinary climates if the tires will stand a proper drop-test. Similarly, experience in shipbuilding yards and elsewhere has led to the specification of mild steel having a tensile strength of from 26 tons to 32 tons per square inch, that quality being found best able to sustain without injury the contingencies of working. Probably a limit of 46 tons to 50 tons in the case of tires and of 27 tons to 30 tons in that of axles, with proper drop-tests, would, on the whole, be the best to specify in order to secure the most suitable steel for the respective purposes.

* Ueber die Festigkeitsversuche mit Eisen und Stahl. Berlin, 1870.

Transportation in Congress.

In the Senate on the 9th:

Mr. Sawyer, of Wisconsin, offered a resolution instructing the Secretary of War to ascertain and report to Congress at its next session the cost of constructing the Sturgeon Bay & Lake Michigan Ship Canal, in Wisconsin, by whom said ship canal was constructed, and also the amount of money realized from the sale of the lands granted to Wisconsin, to aid in the construction of the said ship canal; said information being required for the purpose of considering the question of opening the canal free to the commerce of the lakes. Adopted.

In the House on the 9th:

The Agricultural Department appropriation bill being under consideration, Mr. Hazeltine, of Missouri, offered an amendment providing that the agricultural reports shall give a full statement showing the freight charges for the chief agricultural products on the principal lines of railroad and river routes to the principal markets of the United States. Adopted.

In the Senate on the 10th:

Mr. Voorhees, of Indiana, introduced a bill to aid in the construction of the Maryland & Delaware Ship Canal, and to secure to all vessels of the United States service for all time the right of navigation through said canal, free of toll and charges. The bill provides for a government guarantee of $4,000,000 bonds of the Canal Company.

In the House on the 13th:

Mr. Pacheco, of California, introduced a bill to repeal the land grant of the Atlantic & Pacific Railroad Company, extending through and within the limits of California, and provides that such lands, except so far as the road was com-

pleted July 4, 1879, shall be restored to the market and disposed of in the same manner as other public lands.

A bill to authorize a railroad bridge across the Mississippi River, between Wabasha and a point below the mouth of the Chippewa River, Wisconsin, was passed.

In the Senate on the 13th:

The Committee on Appropriations reported the post office appropriation bill with amendments. By one of these the House item of "$500,000 for necessary and special mail facilities on trunk lines" is stricken out and the following amendment substituted for it: "For necessary and special facilities on railroad lines, $650,000—said facilities to be ratably distributed as nearly as may be on railroad lines leading to and from the principal cities in the different parts of the United States."

The House Committee on Commerce has heard arguments on the Reagan inter-state commerce bill from Messrs. Emory A. Storrs, Wayne McVeagh and George R. Blanchard, all of whom made extended arguments against the bill. Commissioner Albert Fink and Mr. Chauncey M. Depew are also to be heard.

In the Senate on the 15th:

Mr. Brown, from the Committee on Railroads, reported amendments to the bill granting a right of way through the Choctaw and Chickasaw nations to the St. Louis & San Francisco Railway Company requiring that company within 90 days from the passage of the act to accept the provision, and within one year from the date of acceptance to complete the road. If, however, it fails to construct the road within the time specified, then all its rights under the act are to cease, and the Chicago, Texas & Mexican Central Railroad Company is to succeed under the same conditions to all the rights and privileges conferred by the act upon the St. Louis & San Francisco Company.

The House Committee on Pacific Railroads has drawn up a substitute for the pending bill with regard to the consolidation of railroads in the territories. The substitute gives to such railroads the right to consolidate where they are not parallel or competing lines.

THE SCRAP HEAP.

The American Freight-Car Brake.

The American Brake Co. during the month of February had an inspection made of the freight cars equipped with its brake as they came into the St. Louis & San Francisco yard in St. Louis. In all 302 cars were inspected, of which 32 were new cars just received; 58 had been running one month; 115 two months; 66 three months; 13 four months; 6 six months; 5 eight months, and 7 twelve months. The condition of the brakes on these cars is reported as follows: 239 were in perfect order, needing no attention; 38 required some fixing by hand, such as tightening, connecting, etc.; 23 required new pieces, such as nuts, bolts, etc., put on in yard; only two had to go to the shops for repairs of brake. The object of this inspection was to ascertain the wearing qualities of the brake. The need of slight repairs came, in most cases, from careless use.

Rules Concerning Gas Consumption.

The following rules for the consumption of gas have recently been announced by General Manager Felton, of the New York & New England road:

"At all points where gas is used by this company, the agent or other officer in charge will read the meter personally every month, in the presence of the proper representative of the company furnishing the gas, and will make out a report of the consumption on blank form No. 1,313. When the bills for gas are presented he shall examine them carefully, and if they correspond with the readings taken he shall attach them to the report and forward to the proper officer.

"At points where gas is not authorized to be used during the night, as soon as it is put out it shall be turned off between the meter and the service pipe; this duty must not be postponed until morning. Where gas is authorized to be burned all night, as soon as there is sufficient daylight to put out the same rule shall be observed. When shutting off gas, note state of meter, and note again when turning it on, in order to check any leakage. A notation must always be made on the report, stating the average number of hours during which gas is turned off.

"Pressure indicators will be placed (as soon as they can be procured), on the outlet pipe near the meter, to indicate the pressure of the gas, at all points where regulators are not used. The pressure should average from one to three inches; when over the latter figure a note must be made of it, and the average pressure must be given on the report, for points where regulators are not in use. The record of the pressure must be made daily, at the time when the largest consumption of gas occurs, and the average taken from this. Where regulators are used, state the fact in place of giving this information.

"Burners must be cleaned regularly once a month, and as much oftener as necessary to give an even flame. Burner cleaners or an ordinary visiting card should be used for cleaning them.

"All burners will be supplied from Norwood shops, and no others must be substituted for them, and no change made in the burners except by an inspector authorized by the Superintendent or head of department. These burners will all be carefully tested and sealed before leaving the shop.

"All stopcocks for regulating the gas at the burner must be greased every three months to prevent leakage; special grease for this purpose will be furnished.

"In case any defects or leakages are discovered, the matter must be at once reported to the Superintendent or head of department, so that an examination can be made.

"It is hoped that careful attention to the above instructions will result in a large decrease in the consumption of gas. The care and attention of the different agents will be indicated by the percentage of decrease which their records show."

Agents' and Officers' Bonds.

The Fidelity & Casualty Insurance Co., which does a large business as surety for railroad agents and officers, reports to the Insurance Department of New York assets amounting to $375,100; liabilities (including $92,000 reserve fund), $111,422, leaving a surplus as to policy-holders of $263,678. The company received last year $172,500 on capital account, its capital stock having been increased; its receipts from premiums were $178,624 and from interest, $7,679, a total of $186,303. The losses during the year were $66,671 and the expenses of conducting business, $96,179; the latter were largely increased by preliminary expenditures incurred in extending its operations. The premium income increased $68,000, and the ratio of expenses to premiums decreased 11 per cent. Messrs. David Dows, Alexander Mitchell and J. D. Vermilye have recently been added to the board of directors.

How Spotters Are Treated in Colorado.

Several weeks ago a general commotion was created in railroad circles by the wholesale removal or discharge of the freight and passenger conductors on the Denver & Rio Grande Railroad. Almost a clean sweep was made, only four or five of the men being allowed to remain. The nature of the charges against them is not definitely known, but two theories are advanced. One is, that a recent change in the management of the road resulted in the displacement of the men in order that room might be made for favorites of the officials. Another is, that for some time past the management has had reason to suspect that a conspiracy existed between the conductors, the object being to defraud the company. It is believed, in support of the latter theory, that for several months the company has had detectives, or spotters, watching the operations of the ticket-punchers, and these men obtained sufficient evidence to warrant the discharge of all the conductors who were let out. The latter theory is likely the correct one. At any rate, it is certain that the conductors were discharged and new men put in in their places. Several of the discharged conductors reside in Denver, while other claim their residence at different points along the line.

In connection with the recent wholesale change of conductors on the Denver & Rio Grande road, the treatment of a suspected spotter furnishes an illustration of the feeling against this class of men. About six or eight months ago a man named Duckworth was placed in charge of the express business on the San Juan Division of the Rio Grande road. He is an old-time detective, and enjoys quite an extensive reputation as a fly man in the business. He is also a well-known railroad man, and stands high in the estimation of railroad officials. When the discharge of the conductors occurred, several weeks ago, suspicion was directed, for some cause, against Duckworth. The fact that he had formerly been a detective likely had something to do with directing this suspicion, but at any rate the feeling became prevalent that he had done the spotting that resulted in the discharges, and a plot was concocted to get even with him. Duckworth stopped off at Chama a few nights ago, and some unknown parties captured him and carried him out to the suburbs with the avowed intention of hanging him. They even went so far as to put a rope around his neck, and at one time it looked as if his doom was sealed. Duckworth, however, never weakened. And he persisted in declaring that his would-be destroyers were mistaken, and that he had never taken any part in the business at all. Duckworth's clothes were thoroughly searched, but no papers were found that implicated him in the slightest degree. The mob were thoroughly in earnest in the intention to hang Duckworth, but after the discovery that there was no positive evidence of his guilt a consultation was held, and it was determined to release him. This was accordingly done. The rope was taken from his neck, and Duckworth was told to return to town. He waited not for a second order, but at once started. The mob dispersed, disappearing in the darkness, and leaving no trace behind them. Duckworth certainly had a very narrow escape.—*Denver (Col.) Republican.*

Railroad Perils.

The large number of residents of this city connected with railroads in some capacity that imperils life in the discharge of their ordinary duties, make it a matter of general interest that some way be found to reduce the danger and facilitate labors that are hard enough at best. A year or less ago the *News*, at the suggestion of an experienced freight yard-master, pointed out several grave obstructions to the safe performance of the work of men employed in freight yards, and about freight yards. One of these was the peril from guard-rails, in which a foot is easily caught, and sometimes held till a backing car crushes or it kills the owner. Another was the ill-contrived stirrup and ladder for the ascent of cars by brake-hands. They have to set foot in an iron stirrup on the side of the car, and then swing around the corner and climb a ladder at the end, a particularly perilous operation with a car in motion, as it usually is when brakemen have to mount to the roof of it. Another, and the most common cause of death or disablement, is the coupling of cars, of which one must always be in motion at the moment the link is run in and the bolt dropped. No less than 2,800 men are reported to have been fatally crushed or seriously crippled in coupling cars during the past year in this country. This is the slaughter of a bloody battle. And it really seems as if American ingenuity, so prolific in directions involving less grave consequences, were paralyzed by car-coupling. There has been no improvement, and substantially no change, since box cars were first made. Those that came here on the first train on the Madison road in 1847, well on to 35 years ago, are just like those that came in this morning, and are coupled the same way, at the same risk of life and limb. It is doubtful if there is another implement, appliance or machine in the world of so much importance as a freight car, which has undergone so little change, and which has not been considerably improved in 30 years, except this one solitary indispensable implement of commerce and civilization. And as its use is annually increased by thousands of additions and more constant service, the destruction its deficiencies cause increases proportionally. A reward of $5,000 for an improved cattle car has produced 700 applications in a few months, none of them seeming, however, to reach the requisite perfection. Would not railroad managers do their lines, their hands, and the whole world a service to combine and offer $10,000 or $50,000 for any easy, safe and durable car coupling, a safer guard rail, and a better climbing step and ladder?—*Indianapolis News.*

LOCOMOTIVE RETURNS, NOVEMBER, 1881.

Master Mechanics of all American railroads are invited to send us their monthly returns for this table.

Name of Road.	Miles operated	Locomotives in service	Mileage. Total	Mileage. Average per engine.	Miles Run To. Ton of coal	Miles Run To. Cord of wood	Miles Run To. Pint of oil	Average Train. Passenger cars	Average Train. Loaded freight cars.	Cost in Cents per. Passenger car mile	Cost in Cents per. Freight car mile	Cost per Mile in Cents for. Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of. Coal, per ton	Wood, per cord
			Total	Average per engine.	Ton of coal	Cord of wood	Pint of oil	Passenger cars	Loaded freight cars.	Passenger car mile	Freight car mile	Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	$	$
Allegheny Valley, River Div.*	139	40	96,297	2,407	31.87	.....	20.46	3.20	21.70	4.203	1.108	6.84	4.76	0.58	.....	6.40	18.58	.....	.....
Low Grade Div.*	120	21	46,298	2,205	29.20	.....	15.95	2.80	22.70	2.960	0.885	2.36	4.90	0.72	.....	6.34	14.32	.....	.....
Buffalo, Pitts. & Western*	173	24	55,115	2,296	37.72	.....	20.68	2.60	11.70	3.846	1 227	2.10	4.62	0.58	.....	5.32	12.35	1.50	2.20
Central Pacific, Western Div.†	200	32	91,829	2,869	60.15	.....	17.20	.....	.....	.....	.....	2.05	10.6	0.53	0.33	6.83	20.40	6.65	4.25
Northern & San Pablo Divs.†	104	32	85,090	2,659	40.62	.....	17.24	.....	.....	.....	.....	3.93	16 34	0.85	0.33	7.7.	28.85	6.65	4.25
Visalia Div.†	177	16	43,750	2,922	38.86	.....	19.51	.....	.....	.....	.....	3.17	21.47	0.46	0.05	7.48	32.63	6.65	4.25
Tulare Div.†	170	12	41,215	3,435	29.01	.....	18.09	.....	.....	.....	.....	2.77	34.5.	0.0	0.38	8.07	46.27	6.65	5.05
Los Angeles, Yuma, San Diego, & Wilm. Divs.†	416	38	134,357	3,536	40.82	.....	15.96	.....	.....	.....	.....	2.60	24.77	0.5	0.27	7.13	35.34	6.65	5.05
Gila Div.†	248	20	79,629	3,981	48.79	.....	20.50	.....	.....	.....	.....	1.89	20.76	0.49	0.11	6 66	29.87	10.20	5.05
Tucson Div.†	219	23	64,704	2,813	32.51	.....	15.39	.....	.....	.....	.....	2.13	31.26	0.58	0.26	8.47	42.70	6.65	5.05
Rio Gr'de & El Paso Divs.†	142	14	38,754	2,768	59.82	.....	13.91	.....	.....	.....	.....	1.64	16.88	0.64	0.62	6.7.	26.48	6.65	5.05
California Pacific Div.†	179	13	38,917	2,69 9	36.88	.....	22.00	.....	.....	.....	.....	1.47	18 00	0.46	0.60	7.86	28.39	6 6	5.05
Stockton & Copperopolis†	49	3	6,214	2,071	.....	62.14	28.00	.....	.....	.....	.....	1.63	6.84	0.32	0.30	6.8	15.17	.....	4.25
Sacramento Div.†	119	43	107,915	2,509	.....	24.54	20.19	.....	.....	.....	.....	4.96	17.32	0.45	0.32	8.60	31.71	.....	4.25
Oregon Div.†	151	6	22,302	3,732	.....	40.94	23.28	.....	.....	.....	.....	19.11	10.38	0.42	0.08	7.5	37.51	.....	4.25
Truckee Div.†	205	29	81,460	2,809	27.29	82.80	19.38	.....	.....	.....	.....	3.02	22.9	0.46	0.35	8.40	35.13	6.6	4.25
Humboldt Div.†	209	23	64,778	2,816	36.35	.....	20.54	.....	.....	.....	.....	4.63	18 29	0.44	0.29	7.70	31.35	6.6	4.25
Salt Lake Div.†	219	30	95,860	3,195	25.09	.....	15.23	.....	.....	.....	.....	6.21	26 49	0.67	0.22	7.15	40.64	6 6	4.25
Chi. & Eastern Ill., Main Line‡	160	56	112,481	.....	31.00	.....	14.00	.....	43.76	.....	.....	4.30	5.40	0.50	.....	5.50	15.70	.....	.....
Terre Haute Div.‡	65		35,9 5	.....	32.00	.....	15.00	.....	31.00	.....	.....	2.26	9.11	0.40	.....	4.10	15.80	.....	.....
Cleveland & Pittsburgh*	295	66	236,565	3,56.	47.08	.....	17.88	4.20	17.20	2.717	0.951	3.15	3.76	0.65	2.56	6.44	16.26	.....	3.00
Cleve., Tus. Val. & Wheeling.	158	29	77,995	2,724	39.77	.....	21.30	.....	35.00	.....	.....	4.54	1.98	0.45	.....	5.80	12.77	0.7.	2.00
Dela., Lacka. & Western, Bloomsburg Div.§	80	27	78,924	2,923	.....	.....	28.19	.....	.....	.....	.....	2.88	.....	0.62	.....	4.7.	8.2.	.....	.....
Erie & Pittsburgh*	98	29	77,102	2,656	37.90	.....	15.95	3.80	16.80	2.494	1.083	2.96	5.22	0.7.	1.7.	6.6	17.34	1.98	1.9.
Grand Rapids & Indiana	332	41	136,567	3,3 1	35.69	33.45	15.87	.....	.....	.....	.....	2.26	9.24	0.5.	1.12	5.7.	8.86	3.5.	2.5.
Illinois Central, Chicago Div.‖	365	112	262,009	2,339	28.59	.....	13.00	4.37	20.73	.....	.....	4.80	5.85	0.36	.....	5.91	16.91	1.6.	3.0.
Middle Div.‖	101	27	18,625	690	38.86	.....	16.51	1.97	12.46	.....	.....	1.06	4.85	0.26	.....	5.00	11.17	1.60	3.25
North Div.‖	345	65	145,754	2,242	2..51	.....	11.93	3.88	13.47	.....	.....	4.70	6.50	0.40	.....	5.8.	17.41	1.9.	3.25
Springfield Div.‖	113	17	36,971	2,195	26.87	.....	18.26	1.99	11.71	.....	.....	1.53	5.42	0.32	.....	5.21	12.48	1.40	3.00
Iowa Div.‖	401	35	126,922	3,6.6	25.62	.....	14.42	3.93	11.6	.....	.....	3.80	9.05	0.33	.....	5.71	18.88	2.25	5.0.
Jeff., Madison & Indianap.*	226	43	124,380	2,89.	33.44	.....	14.55	3.03	22.36	5.380	1.060	3.88	8.94	0.45	2.2.	6.02	21.5.	2.8.	4.40
Kan. City, St. Jo. & Coun. Bl ¶	247	80	136,989	3,512	36.20	.....	23.90	3.80	17.10	.....	.....	3.36	6.3.	0.30	.....	5.7.	15.6.	2.20	3.50
Lake Shore & Mich. Southern, Buffalo Div.‡	....	89	214,061	2,405	33.34	64.42	24 80	.....	.....	.....	.....	3.9.	7.9.	0.28	.....	6.19	18.3.	2.60	5.30
Erie Div.‡	....	120	3 6,193	2,551	33 6	.....	27.29	.....	.....	.....	.....	5.87	3 97	0.33	.....	5.8.	19.0.	2.4.	5.43
Toledo Div.‡	....	90	213,315	2,370	25.63	65.50	16.21	.....	.....	.....	.....	4.33	10.44	0.41	.....	7.0.	22.2	2.6.	4.8.
Mich. Southern Div.‡	....	229	636,242	2,778	34.82	81.00	1.49	.....	.....	.....	.....	4.38	8.9.	0.33	.....	6.0.	19.71	3.10	4.63
Little R'k, Miss. Riv. & Texas.	155	10	28,654	2,86.	.....	59.00	13.00	.....	.....	.....	.....	3.74	3 82	0.52	1.44	6 51	16.1	.....	2.25
Louisv'e & Nash., First Div.**	435	61	178,915	2,93 3	26.62	.....	11.18	5.25	18.39	2.969	1.190	2.24	8.15	0.46	1.38	6.55	18.86	2.15	4.20
Second Div.**	200	28	79,208	2,829	29.89	.....	10.65	4.39	19.03	2.980	0.989	3.35	6.37	0.4.	1.4.	6.58	18.34	2.1.	4.55
Memphis Div.**	139	16	47,865	2,993	31.14	.....	15.07	4.95	16.8.	2.760	1.400	2.49	7.74	0.57	1.51	6.1.	18.5.	2.3.	5.00
Nash. & Decatur Div.**	132	30	74,355	3,380	26.17	.....	15.26	4.20	14 94	3.800	1.340	3.64	7 31	0.34	1.42	6.57	19.15	1.8.	2.30
South & North Ala**	189	37	105,128	2,841	24.56	.....	14.34	4.00	13.58	3.440	1.490	4.28	7.30	0.4.	1.44	6.24	19.66	1.7.	2.50
Mobile & Montgomery**	180	5	70,062	2,171	34 62	.....	14.61	5.17	16.77	3.020	1.270	5.19	7.71	0.36	1.17	6.44	20.87	2.0.	.50
St. Louis Div.**	207	33	83, 58	2,517	39.38	.....	14.03	3.12	13.51	3.230	1.260	3.9.	3.67	0.39	1.37	5.8.	15.2.	1.89	1.50
Ev., Hen. & Nash. Div.**	135	36	83,751	2,326	24.48	.....	13.37	3.10	13.65	4.510	1.560	5.08	3.65	0.31	1.84	6.48	19.97	1.35	1.75
New Orleans Div.**	141	26	73,072	2,810	42.55	.....	14.85	4.78	20.80	3.430	0.920	3.70	6.21	0.33	0.89	6.43	17.55	3.0.	4.00
Pensacola & Selma Divs.**	154	30	33,449	1,115	46.76	.....	15.08	.....	7.12	.....	2.690	6.21	5.58	0.40	0.69	6.38	19.26	2.52	1.87
Louisv., Cin. & Lexington**	325	37	113,944	3,079	37.91	.....	13.05	4.08	12.69	3.080	1.890	4.59	6.67	0.45	0.94	6.64	19.29	2.15	2.75
Marquette, Hough. & Ont.	88	27	47,435	1,757	39.53	.....	21.76	.....	36.84	.....	.....	0.92	11.11	0.46	.....	5.7.	18.2.	4.2.	.....
N. Y., Pa. & O., Eastern Div.	225	71	238,502	3,360	27.44	.....	13.28	5.70	24.30	.....	.....	2.75	8.0.	0.63	.....	6.3.	17.7.	2.15	2.74
Western Div.	197	58	197,560	3,406	20.35	.....	19.94	6.50	17.50	.....	.....	3.21	9.84	0.41	.....	5.84	19.4.	2.14	2.74
Mahoning Div.	141	53	169,801	3,185	26.37	.....	18.23	3.40	23.60	.....	.....	3.16	6.55	0.47	.....	5.6.	15.8.	2.3.	2.74
No. Cent., El. & Can. Divs.	147	47	121,335	2,582	24.75	.....	17.24	.....	.....	.....	.....	3.79	7.28	0.54	.....	6.06	17.6.	1.80	1.20
Ohio Central	232	81	135,689	4,357	38.50	.....	21.49	.....	.....	.....	.....	2.88	2.25	0.32	.....	5.21	10.76	.....	.....
Pennsylvania, N. Y. Div.††	120	139	410,147	2,951	29.8.	.....	8.62	.....	.....	.....	.....	6.80	10.19	1.10	.....	.....	17.80	3.00	4.00
Amboy Div.††	204	50	108,680	2,174	47.01	.....	13.85	.....	.....	.....	.....	4.30	6.40	0.70	.....	.....	11.40	3.00	4.00
Belvidere Div.††	80	41	76,096	1,856	26 81	.....	11.55	.....	.....	.....	.....	3.80	11 30	0.90	.....	.....	16.00	3.00	4.00
Philadelphia Div.††	206	158	506,627	3,206	23.88	.....	12.06	.....	.....	.....	.....	5.50	5.20	0.70	.....	.....	11.40	1.2.	2.72
Middle Div.††	132	105	345,272	3,288	21.52	.....	13.23	.....	.....	.....	.....	5.30	5.80	0.60	.....	.....	11.70	1.20	2.72
Altoona Div.††	56	27	54,852	2,032	39.91	.....	32.65	.....	.....	.....	.....	9.50	3.10	0.50	.....	.....	13.10	1.20	2.72
Pittsburgh Div.††	172	188	539,897	2,95.	22.72	.....	10.02	.....	.....	.....	.....	6.20	5.30	0.80	.....	.....	12.3.	1.2.	2.72
Tyrone Div.††	127	46	102,610	2,231	18.56	.....	14.75	.....	.....	.....	.....	5.30	6.50	0.65	.....	.....	12.4.	1.2.	2.72
West Penn. Div.††	104	21	49,972	2,380	30.98	.....	22.05	.....	.....	.....	.....	4.6.	3.90	0.40	.....	.....	8.90	1.20	2.75
Lewistown Div.††	63	10	17,226	1,723	24.61	.....	17.18	.....	.....	.....	.....	15.80	4.90	0.50	.....	.....	21.20	1.20	2.78
Bedford Div.††	57	6	11,874	1,979	25.87	.....	20.83	.....	.....	.....	.....	6.40	4.70	0.40	.....	.....	11.50	1.20	2.72
Frederick Div.††	109	10	23,617	2,362	28.07	.....	17.92	.....	.....	.....	.....	1.60	4.40	0.60	.....	.....	6.60	1.20	2.72
Monongahela Div.††	54	13	33,847	2,604	41.87	.....	13.12	.....	.....	.....	.....	1.40	2.20	0.60	.....	.....	4.90	1.2.	2.86
Phila., Wil. & Baltimore, Maryland Div.††	...	69	205,731	2,996	42.98	.....	9.94	.....	.....	.....	.....	3.50	5.70	0.70	.....	.....	9.90	2.40	2.64
Central Div.††	....	22	41,052	1,866	35.09	.....	10.35	.....	.....	.....	.....	9.20	6.70	0.60	.....	.....	16.50	2.4	2.75
Delaware Div.††	....	17	33,524	1,972	44.70	.....	11.82	.....	.....	.....	.....	6.3.	5.60	0.60	.....	.....	12.50	2.40	2.64
Pitts., Ft. Wayne & Chicago, Eastern Div.*	403	159	490,203	3,083	34.24	.....	16.29	5.30	16.20	2.930	1.051	2.87	5.76	0.74	1.33	6.39	17.09	1.98	1.98
Western Div.*	280	118	422,016	3,576	31.3.	.....	16.75	6.40	21.30	1.773	0.855	3.34	5.37	0.44	1.76	6.09	17.00	1.68	1.68
Pitts., Cin. & St. Louis. Little Miami Div.*	197	39	136,097	3,468	37.74	.....	12.96	4.58	16.67	2.476	1.000	3.06	5.39	0.65	2.74	5.62	17.46	2.00	1.65
P., C., & St. L. Div.*	247	112	328,535	2,942	26.97	.....	19.01	6.32	16.89	2.550	1.560	11.24	4.27	0.51	2.54	5.71	24.27	1.10	2.70
Wabash, St. L. & Pacific, Peoria & Iowa Div.	686	100	306,658	3,067	28.12	.....	15.26	.....	.....	.....	.....	3.87	5.48	0.42	.....	6.88	16.65	1.50	2.50
West Jersey††	163	22	49,608	2,255	35.78	.....	11.60	.....	.....	.....	.....	3.00	10.10	0.70	.....	.....	13.80	3.60	3.94

* Five empty cars rated as three loaded ones.
† Switching engines allowed 6 miles per hour; helping engines, actual distance run.
‡ Switching engines allowed 6 miles per hour.
§ Fuel not estimated.
‖ Two empty cars rated as one loaded one.
¶ Three empty cars rated as two loaded ones.
** Switching engines allowed 6 miles per hour; five empty cars rated as three loaded ones.
†† Engineers', firemen's and wipers' wages not included in cost.
The ton of coal is 2,000 lbs., unless otherwise noted; 25 bushels counted to the ton.
Repairs generally include all shop expenses.

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S WRIGHT DUNNING AND M. N. FORNEY.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

ARGUMENTS BEFORE THE ADVISORY COMMISSION.

The railroad companies have engaged three eminent gentlemen to listen to arguments from the commercial organizations and others of the great exporting cities on the question whether the rates from the West to New York, Philadelphia and Baltimore should be the same or different. They have finished their week's session in New York, and as we write are in Philadelphia. Considering the complaints made in the newspapers at different times in the last eight years, and the character of some of the organizations that appeared before the Commission, the slightness of the evidence and the weakness and inconsequence of the arguments offered at New York are astonishing. A case in court no better supported than that of the New York merchants has been would be thrown out without waiting to hear from the other side. The case is left just about as it was at the beginning, and the commission has little more to guide it than it had, or might have had, before it assembled—Mr. Walker's excellent and trustworthy Produce Exchange statistics, and Mr. Fink's elaborate report on the subject of differences in rates to seaboard points, which was privately issued last December, and contain a great mass of statistics, many obtainable only in his office, besides a careful consideration of the whole question.

In a case of this kind (fortunately for New York) the Commissioners will doubtless not depend solely on the evidence and the arguments of those whom we may call the parties to the suit; but will themselves search for facts bearing on it, and themselves bring forward in their minds arguments which may have been neglected by the representatives of the several cities. Fortunately for New York, we say, for we are sure that it will be easy for the other cities to make out a case which, for all that was shown by the New York merchants, would justify a claim for increasing rather than abolishing the existing differences in favor of Philadelphia and Baltimore.

The gentlemen who have argued the case so far seem never to have settled upon any principles on which it should be decided. It is not enough to show that traffic here or there is growing or declining. Why should it not? Why should it? Who has any rights to traffic and why do they have them? If Oldtown is losing its trade and Newtown is getting it, Oldtown, if it would have any one help it in getting back its business, should show that those whose help it asks will be benefited by the change—whether a railroad or the public, or any given community. It is not a matter of any general or public importance that Oldtown should have a big trade and Newtown a little one. But is of importance mainly to:

1. Those who carry traffic to Oldtown, but cannot, or cannot with so great profit, to Newtown.
2. The owners of real estate at Oldtown.
3. Those engaged at Oldtown in the trade which Newtown is diverting.

The carriers' interest may very well be greater than that of the other two combined. Certainly a railroad which carries grain 500 miles ought to make more profit on it than the average profits of those who simply buy and forward it. Such a road will certainly do all it can to prevent the diversion of the traffic to a place to which it cannot carry.

But in this case there are carriers who lose as well as carriers who gain if grain goes to New York. Not all the carriers, then, can be got to work for that city.

When the competition of a rival city is felt, all that makes those engaged in the trade desirous of preventing a diversion of trade is their wish to preserve their *profits*. If the competition is because of less cost at the rival town, then the only way the diversion of the whole trade can be prevented is by some or all parties at the old market accepting smaller profits than are made by their rivals. But very frequently the competition is because at the new place smaller profits are accepted than have been made at the old one, the cost being the same, or even greater, at the new one.

The difference between the cost of grain at Chicago and on a vessel in an Atlantic port is made up of carriers' expenses, carriers' profits, merchants' expenses and merchants' profits. Should the traffic be diverted from New York to Baltimore or Boston, because the New York merchant made charges yielding him larger profits than were accepted elsewhere, it would not be the *duty* of any carrier, not even of one carrying to New York only, to reduce its profits in order that the New York merchant might make more than his rivals, and if wise it would not do it, and the merchant would be compelled to accept as small profits as his rivals in other cities. If the merchant's expenses were much greater in New York than elsewhere, it could hardly be for any other reason than that *rents* were higher in New York, necessitating higher wages, as well as higher office and storage and dock expenses; that is, the greater cost would be because of larger profits to the landholder. Now neither the public nor the New York carriers, much less the other carriers, are in the slightest degree benefited by having $10,000 paid for the rent of a piece of ground in New York such as can be had for $1,000 in Philadelphia or Baltimore. If the latter places compete because of lower rents, neither the merchants nor the carriers at New York are bound to reduce their profits in order to keep up New York rents. If they do reduce profits it will be, or should be, to preserve the business for themselves, and because other trades keep up rents. We venture to say that the rents paid in New York over what similar property would bring in Philadelphia or Baltimore amount yearly to something like ten times as much as the excess of the railroad charges on freight to New York over the Baltimore rate.

A good deal has been said by the New York merchants of the cheapness of carriage by the New York railroads, or rather by one of them, as a reason why traffic should go to New York. There are some excellent arguments which show that grain can be carried to Philadelphia not only for less, but for less per mile, than to New York; but it is doubtless impossible to establish exactly the cost to different places; nor is it necessary. The cost, unless the differences are very great, has little to do with the question, and if it should be proven conclusively that the cost per mile is less to Philadelphia and Baltimore than to New York, the New York merchants would urge, and properly, that the railroads carrying to New York only, or only at a disadvantage to Philadelphia or Baltimore, should still insist on rates which would enable them to carry a large share of the traffic to New York, which they undoubtedly would do, and successfully.

The trunk line railroads, on the average, pay about 60 per cent. of their earnings for working expenses and the other 40 per cent. for interest and other fixed charges and dividends. Let us suppose that the cost by the cheapest route to the seaboard is $60 per car-load; then by making the charge $100 per car-load the freight pays the average contribution to interest and dividends. Now another road can carry to another place, whence the cost of exporting is the same, at a cost of $65 per car-load. But if it charges $105 per car, making the same profit as the road to the other port, it will get no part of the export traffic. The alternative for it is to accept a profit of $35 a ton on a portion of the traffic or to get no profit at all. Of course, it makes a rate which gives it a share of the traffic, so long as there is any profit whatever in the rate. Only when the rival road reduces its rate below $65, and keeps it there, does it give up the business.

And the case is the same if there is no difference in cost by rail, but the cost of exportation is higher at one place than another; and both the disadvantages may be against one place, and still its carriers will get a share of the business by accepting profits enough less to counterbalance the sum of the disadvantages.

There is scarcely a merchant in the world who does not and does not have to act on this principle, which is simply that half a loaf is better than no bread; but the merchants seem very slow to recognize it when the carriers act on it. What makes the two cases seem different is that a very much larger share of the carrier's *average* charge goes for interest on his investment than in almost any purely mercantile business. The grain merchant takes half a cent a bushel from his profits to meet competition, perhaps, and finds then that he can take off nothing more without absolute loss; but the carrier can reduce a rate of one dollar, affording average profits, to 60 cents, and still cover his expenses—be no worse off than if he lost the business; in fact much greater reductions are possible without actual loss on the business, because expenses do not decrease in proportion when traffic is lost.

If the cost of transportation by different routes were absolutely determined or determinable, and the road carrying the cheapest should insist on making its rate lower than the rate of other lines by the amount of difference in cost, if these other roads did not do business at a loss it could eventually get all the traffic, but only by carrying at a profit no greater than the difference in cost on it and on the cheapest of the other roads. Let us say that the New York Central can carry to New York at a cost of $3 per ton, and that it costs the Pennsylvania $3.10 and the Baltimore & Ohio $3.20 to carry the same amount from the same place to New York, or to carry it to some other port and pay the excess of the cost of export from that place. The New York Central begins by charging $5 per ton, in order to earn interest on its cost. The other roads making the same rate, it reduces to $4.90, and this process is repeated until the New York Central makes its rate $3.10. This being the lowest cost by any other road, and no road (we assume) accepting traffic without some profit, the New York Central and New York and Boston get all the business. This may suit New York exactly, but it will not suit the public nor the New York Central Railroad, not to say the other railroads and the other cities. As business has been distributed recently, while differences in rates were supposed to be maintained, New York had about five-ninths and Philadelphia and Baltimore each about two-ninths of the total traffic to the three places; assuming thet all of it would be diverted by differences in rates, than by accepting 10 cents instead of the average profit of $2 per ton, the New York road would carry 1,800 tons for every 1,000 it formerly carried, which is good for New York; but the New York road makes a profit of but $180 on the 1,800 tons, while on the 1,000 tons it made $2,000 profit. Of course it doesn't like this, and it will not permanently follow any policy which so increases its traffic at the cost of reducing its profits.

The other patrons of the New York Central will not like it, because they have to pay nearly the whole interest on the cost of the road, a large part of which was formerly borne by the New York through traffic.

Of course the roads to Philadelphia and Baltimore will not like it because these roads will get no profit from through traffic; and their patrons will not like it, because other traffic will have to pay the whole interest on their cost.

Now it is just this feature, the desirability, for the railroad companies and the community alike, that the through traffic should pay a fair share of the interest on the cost of the railroads which carry it, which prevents this question from settling itself by ordinary competition. Ordinary competition inevitably results in throwing nearly the whole burden of supporting the roads—paying interest on their cost—on the local traffic. Under no circumstances is it possible to make grain pay as much as the average necessary profit; the competition of Californian and Russian wheat-growers effectually prevents this, and the competition of the various water routes does so still more. Scarcely ever do circumstances exist when by any possibility this particular traffic can be made to pay more than its proper share of the interest on the cost of the roads. It is of public importance that measures should be taken, if possible, which will prevent the carrying of grain a thousand miles for 10 or 15 cents a hundred, when the same price is charged for carrying similar freight 50 miles

and has to be charged in order to pay interest on the cost of the roads.

If we had all the facts it would probably not be difficult to show that a Pennsylvania Railroad train can carry grain the 800 miles from Chicago to Baltimore for less cost than the Lake Shore or Michigan Central carrying the 960 to 980 miles by way of the New York Central from Chicago to New York. Suppose it to be true, as some New York merchants claim, that the cost of exportation has been no greater from Baltimore than from New York of late. Then by the arguments of the New York merchants before the Advisory Commission, Baltimore would be entitled to claim a difference in rates which might wholly destroy the New York exports. But they cannot for a moment suppose that this would be permitted. It could only be done, as we have shown above, by reducing the rate to Baltimore so low that roads to other places could not carry without loss, and this would reduce the profits of the Baltimore road on this traffic, though it should have it all, to an insignificant figure. Then it would be the very desire of the roads to Baltimore to secure an adequate profit that would protect New York's grain trade.

In one respect New York's position is exceptional. Boston, Philadelphia and Baltimore all profit by low rail rates on grain; but New York does better with high rail rates, because then the canal gives it the cheapest route. Almost anything is better for New York than a railroad war which makes rail rates lower than canal rates.

The strongest arguments in favor of the demand of New York for a reduction or abolition of the differences in favor of the other ports are, first, the alleged fact that its rail receipts for some time have been kept up only by secret rebates paid by the railroads; and, second, the established fact that the growth of *rail* receipts has been less at New York than at other places. The first, if true, is of very great importance. We cannot intelligently reason on the question, or come to any conclusion about it, unless we know what the *actual* differences of rates have been. As to the second, it has decided importance, but it should be considered that grain is the only important freight which Philadelphia and Baltimore receive for export, while immense quantities of other produce go to New York and Boston, including nearly all the flour and provisions exported. It will be noticed, however, that neither of these questions has anything to do with the cost of transportation. But if New York is not getting a reasonable share of the business under the circumstances, we may be sure that its railroads will insist on having it hereafter, whether the transportation costs them more or less than the cost on other roads, and ineffective arguments and false principles advanced by them or by their patrons will, doubtless, not affect the final result. The statistics from 1876 until 1881 indicate that the New York roads should in most years have obtained a larger share of the grain, though an examination of the receipts of other freight from the West might alter this conclusion. In 1881 New York certainly had nothing to complain of; still less has it this year, when so far the receipts of Philadelphia and Baltimore, as we showed last week, have been extremely light. But in view of the growing consumption of anthracite coal and Pittsburgh coke in the West, it looks as if the day might soon come when if the destination of the grain should be determined by the cost of carrying it by rail, it would all go to Philadelphia and Baltimore, in order that the trains might get return loads at the mines. But the destination never will be determined by the cost alone, and New York will continue to have the greater part of the grain exports until some other port secures a water route cheaper than its canal and cheaper than the cost by any railroad.

Origin and Destination of Trunk-Line Freight.

Last December Mr. Albert Fink completed and distributed among the trunk-line managers a most elaborate discussion of the differences in rates to the seaboard, accompanied by very full statistics illustrating the subject. During the past week this paper has been printed for the information of the Advisory Commission and others considering the question, in a pamphlet of 60 pages. Among the statistics given are some collected by Mr. Fink's office, and nowhere else obtainable, which have not before been made public and have great interest and value. Two tables especially have an interest to merchants and the public as well as to the railroads. One of these gives the total tonnage of east-bound freight passing over the trunk lines, or part of them, from their western termini and points further west, with the quantity billed from each competing point, and from each state; the other giving the west-bound freight from the sea-board over the trunk lines and the number of tons consigned to each western city. The first shows, substantially, from what places the sea-board is supplied with Western produce and their relative importance; the other shows what are the markets for Eastern merchandise, and their relative importance. A similar table for the east-bound shipments for the two years ending with June, 1879, we published in 1879, but there has been nothing similar since; and the table showing the origin of the east-bound freight is altogether new.

There were 10,488,246 tons of freight shipped by rail from the West to the seaboard, or to points on the trunk lines—competitive traffic for the trunk lines—in the year 1881. Of this just 36 per cent. was billed from the ten principal Western cities, as follows:

	Per cent.		Per cent.
Chicago	14.43	Milwaukee	2.66
Peoria	3.72	Cleveland	2.04
Toledo	3.71	Cincinnati	1.46
St. Louis	3.22	Detroit	1.34
Indianapolis	2.72	Louisville	0.70

There was from other competing points of Western lines 6.99 per cent. of the whole, and 13.64 per cent. was billed from the Western termini of the trunk lines mostly from Buffalo, and doubtless nearly all lake freight), but the other 43.37 per cent. was freight which was local to the lines on which it originated.

Chicago, it appears, shipped more freight than St. Louis, Peoria, Milwaukee and Toledo together, and four and a half times as much as St. Louis.

Of the west-bound shipments of the four Atlantic ports and the group of interior New England competing points which ship at the Boston rates and are included with Boston in the reports, amounting in all to 1,871,480 tons, no less than 47.72 per cent. was billed to the ten Western cities named above, which billed but 36 per cent. of the east-bound shipments. Their percentages were, severally:

Chicago	18.52	Milwaukee	2.42
Cincinnati	6.35	Louisville	1.98
St. Louis	6.18	Indianapolis	1.8[illegible]
Cleveland	4.40	Toledo	1.62
Detroit	4.11	Peoria	0.58

Here again Chicago leads, receiving nearly three times as much as St. Louis or Cincinnati, and nearly as much as St. Louis, Peoria, Milwaukee, Detroit, Toledo and Cleveland together. But there are other heavy receivers of eastern freight besides the Western cities. Pittsburgh stands next to Chicago, receiving 13.93 per cent. of the whole—twice as much as either Cincinnati or St. Louis—and Buffalo received 3.08 per cent.

It appears from this that there was one ton of freight shipped west from the eastern termini of the trunk lines for every 5.6 tons shipped east from their western termini.

This doubtless somewhat exaggerates the difference between the two currents of traffic, because there are large shipments to the West from local points on the trunk lines, especially on the Erie and the Pennsylvania, which carry millions of tons of coal west, which are not included in this statement, because not shipped from their eastern termini. The east-bound traffic last year was thus equivalent to daily shipments of 33,509 tons, and the west-bound traffic to 5,977 tons daily. The shipments of Chicago and Peoria alone were more than the total west-bound shipments.

Allowing for the differences in rates from the different points, a rough calculation makes the gross receipts of the east-bound freight of 1881, on the basis of 30 cents per 100 lbs. from Chicago to New York *on all classes*, to be about $51,000,000. while on a basis of 20 cents it would be but $34,000,000. These bases are used for the lowest class freight, and the higher charges on the higher classes make the receipts considerably more when 20 and 30 cents are the rates on grain. Probably not more than a quarter of the traffic is of the higher class, and most of this pays but 5 cents per 100 lbs. more.

The earnings from the west-bound freight it is impossible to estimate from the tonnage and the rates alone, because there are large shipments from each of five classes, paying, in the first half of the year, from 30 to 75 cents per 100 lbs. from New York to Chicago. A very large proportion of this freight is of the higher classes, and its earnings are much larger in proportion to tonnage than those of the east-bound freight. A larger proportion of it than of the east-bound freight, however, moves distances shorter than that between New York and Chicago. Only 38.08 per cent. of the east-bound freight last year was from points east of Indiana and Michigan and north of the Ohio; but 43.61 per cent. of the west-bound shipments were to such points.

The traffic of 1881 in both directions was larger than ever before, the gain in east-bound freight over 1881 being due wholly to diversions from the lakes and canal, and not being very much.

Union Pacific Live Stock Traffic.

The live stock traffic of the Union Pacific Railway has an importance not confined to that company alone. It and the Atchison, Topeka & Santa Fe are now the chief carriers of the live stock from the grazing belt west of the agricultural lands, extending from near the 100th meridian to the Rocky Mountains. This belt when the Union Pacific and the Kansas Pacific were first built afforded substantially no traffic whatever. But it has since been pretty well occupied for grazing cattle, and the progress that has been made in utilizing it can be traced very well by the reports of the number of car-loads of cattle carried by the Union Pacific Railway in each of the last three years as follows:

	1879.	1880.	1881.
Union Division	6,724	8,195	9,429
Kansas Division	3,052	2,293	2,313
Total	9,776	10,488	11,742

In the total there was an increase of 7¼ per cent from 1879 to 1880, and 15 per cent from 1880 to 1881.

It may surprise some to see that the cattle traffic of the northern line is so much greater than that of the southern; but it should be remembered that the former has the traffic of most of the country north of the Kansas Pacific to itself (the Burlington and Missouri River not reaching far enough west to compete for most of it), while the Atchison, Topeka & Santa Fe competes with the Kansas Pacific nearly its whole length and gives it little chance to get New Mexico cattle. Cattle will be driven hundreds of miles to reach a railroad, but they are most likely to be shipped by a line that is near their pastures. Thus the Union Pacific carries cattle that have been driven from Idaho and Montana, because it has been the nearest railroad; but if the Kansas Pacific gets Texas or New Mexico cattle, it is usually because they are driven north for the sake of pasture (as is done to a considerable extent—from Texas to a very large extent). There are about 16 head of cattle to a car load, which makes about 188,000 head carried last year.

Not all these cattle came from the plains. The agricultural country of Nebraska and Kansas produces many also, but there they are but a part of the shipments from the country stations, while further west they make nearly the whole. The agricultural country, however, though it produces much besides, perhaps ships more cattle in proportion to acres than the purely grazing country. At least 6,090 of the 9,429 cattle carried by the Union Division last year were shipped in Nebraska, and 1,629 of the 2,313 carried by the Kansas Division were shipped in Kansas. It will be an error to suppose that all the cattle shipped in these states were produced in them, however. The Texas cattle driven north are shipped in these states and some doubtless from Wyoming and perhaps other territories.

The number of car-loads of cattle last year was equivalent to 30 cars a day over the Union Division and to 7.4 cars a day over the Kansas Division—a very important addition to the traffic of these roads.

Sheep are also raised on the grazing plains, and help to utilize the wide expanse not available for cultivation. They do not as yet make a very important traffic, though, unlike cattle, they supply freight before they are shipped themselves, affording a few pounds of wool per head. The car-loads of sheep shipped over the two divisions of the Union Pacific have been:

	1879.	1880.	1881.
Union Division	124	341	598
Kansas Division	*	239	161
Total	....	580	759

* Not reported.

The increase in sheep shipments was thus 31 per cent. from 1880 to 1881. It will not do to conclude that sheep-growing is increasing at anything like that rate, however. The sheep were usually raised previously for wool, and not for mutton, and when the ranches are not fully stocked they are likely to be kept as long as they will breed, unless mutton is very high; and thus the shipments from a flock of 10,000 sheep may vary greatly from year to year.

Shipments of horses are even greater than those of sheep on this road, amounting to 788 car-loads in 1881, but these were probably mostly from the agricultural and not from the grazing districts.

The hog shipments are wholly from the agricultural country; hogs will not flourish on grass alone, but are grown only where corn is grown. Where corn flourishes, however, so far from market as Kansas and Nebraska, it should be much more profitable for the farmer to feed it to hogs than to ship the grain, as the meat made from the corn is much lighter than the corn. The hog shipments should show pretty well the progress of agriculture in Kansas and Nebraska, though the Union Pacific does not have this traffic to itself, by any means: the Burlington & Missouri River probably has considerably more than half of the Nebraska hog shipments, and several roads share the traffic in Kansas. The number of car-loads of hogs shipped on the Union Pacific has been:

	1879.	1880.	1881.
Union Division	1,450	2,542	1,790
Kansas Division	*	2,060	2,219
Total	....	4,602	4,009

* Not reported.

To show how completely hog-growing is excluded from the grazing districts, we may say that the reports show that last year the number of car-loads from Wyoming was *three*, from Utah *two*, and from Colorado 68, against 1,785 from Nebraska and 3,162 from Kansas.

There appears a decrease of 13 per cent. in the total hog shipments from 1880 to 1881, but this cannot be looked upon as indicating the general course of hog-growing in Kansas and Nebraska, with which failures of the corn crop have

had much to do. The hog shipments in Kansas (by this road) are considerably more than the cattle shipments, but in Nebraska the cattle shipments are nearly three and a half times the hog shipments.

The shipments of live stock of all kinds on this road have been, in car-loads, from different states :

Union Division :	1879.	1880.	1881.
Nebraska	6,676	7,706	8,591
Wyoming	2,154	3,427	3,162
Utah	124	537	560
Total	8,955	11,670	12,313
Kansas Division :			
Kansas	*2,265	4,436	4,182
Colorado	*787	489	803
Total	*3,052	4,925	4,985
Grand total	12,007	16,595	17.298

* Hogs, horses and sheep not reported in 1879.

Wyoming affords this road more cattle than Kansas, and the total live stock shipments it gets from Nebraska are twice as great as those from Kansas, though it must have more road in Kansas than in Nebraska. The reason we have given before: it gets by far the larger part of the Nebraska cattle shipments, but probably a comparatively small part of the Kansas shipments.

The prosperity of this road depends very largely on the growth of the grazing industry west of the 100th meridian. That and the mines may be said to be the only industries of importance possible (so far as we can now see) in that vast territory. Both have grown rapidly; but there have been of late indications that there is not now left room for the rapid growth of grazing that there has been for ten years past, the good situations for ranches (where water is to be had) being generally occupied. The ranchmen can generally largely increase the number of cattle they herd, however, and will doubtless do so; but this will not be likely to increase the total number produced on the plains as rapidly as when numbers of new ranches were established yearly.

Foreign Railroad Notes.

In Germany, as in this country, there is complaint that the passenger traffic grows but slowly, and that great improvements in the comfort and convenvenience of passenger transportation, which have been quite costly, have seemingly had little effect in attracting traffic. On the Prussian railroads, from 1860 to 1879, the passenger mileage per mile of road increased about 23½ per cent., and meanwhile there was a large decrease in the number traveling in first and second-class cars, and paying the higher rate. In 1860, 30.4 per cent. of the travel was in these cars; in 1879, but 21.6 per cent. There was also some decrease in the third class, while the fourth-class passengers, paying a very low rate, increased from 21.4 per cent. to 33.4 per cent. of the whole. The consequence was, that while the travel per mile of road increased 23½ per cent., the passenger *earnings* per mile of road increased in these 20 years only from $2,608 to $2,666, or 2 per cent. Complaint is made that the trains are not nearly occupied, or the average less than one-fourth of the seats being occupied; which, however, is not so much worse than the average in this country, it is expected, where few roads have a larger average train load than 60 passengers. The average weight of car transports in Prussia is 14 tons to one ton of passengers; or about 2,100 lbs. per passenger ; while in freight trains, on the average, the weight of car is but one-half more than that of the freight. A writer, discussing this subject, proposes that the rates on lower classes be reduced and the first-class rate increased, but especially that there be a reduction in the rate per mile for trips of considerable length, which is not now the practice in Germany, where "the sum of the locals by the shortest line," as our passenger men would say, almost invariably is the through rate. This writer shows that the average journey in Prussia, where great pains have been taken to run comfortable through trains to accommodate all wants, was but 22.7 miles in 1879. He thinks that a considerable reduction in the cost of the longer journeys would very greatly increase the number of them. The experience of this country, where this policy has been generally followed to some extent, and sometimes to a very great extent, does not indicate that travel can be made to grow very rapidly in that way, though change from a fixed rate per mile to it might be followed at first by a considerable increase. Here passenger traffic (except in new and rapidly-growing districts) hardly grows at all unless the times are very prosperous.

The French Northern Railroad recently contracted with the John Cockerill Company of Seraing, Belgium, for 2,000 tons of Bessemer rail, at $33 per ton at the works. The Paris Lyons & Mediterranean takes 2,000 tons from the Terre-Noire works at $44 (the Belgian rails must pay a duty). The Orleans Company placed an order for 13,000 tons with the Firminy Steel Works at $46. The Eastern Company has contracted for 6,000 tons of *iron* rails with three different works at $38. Sales of iron fish-plates in France are reported at about $39 per ton and of steel fish-plates at $50. Bolts for such plates cost from $59 to $64 per ton, and galvanized screw spikes $84 to $85, while tarred screw spikes brought $64, and plain ones $55 to $60. A contract for 50 turn-tables of wrought and cast iron, weighing together 385 tons, was made at $49 per ton another at $50, and one for 33 by a different railroad at $48. Contracts for switches were made at $94 per ton for the cast steel, $230 for steel points, $182 for iron points, $110 for other wrought-iron parts, and $40 for cast-iron parts. A contract for 27 plate bridges of various sizes was made at $100 per ton, delivered on the line. Hoisting cranes, 10 for lifting 10 tons and 6 for lifting 6 tons, were contracted at $72 per ton, making the larger ones cost $1,100, and the smaller ones $756 each. The same company ordered 20 other 6-ton cranes of different makers, 10 at $70 and 10 at $72 per ton of weight of the cranes. Another company pays $637 apiece for four 4-ton platform cranes, and $1,220 for a 10-ton platform crane.

The French Eastern Company has contracted in Vienna 20 passenger engines at 14.1 cents *per pound*, and 20 tenders at 8.8 cents per pound, delivered on the road. The same company takes 130 of the famous Arbel wrought-iron wheels, for locomotives, at 8⅜ cents per pound, and it pays about $95 per ton for iron locomotive axles. A sale of 400 forged iron car axles is reported at $92, and of 200 Bessemer or Martin steel car axles at $83 per ton—less for the steel than the iron. Steel tires were bought of a French steel works at $100 per ton, but the same company bought a large lot of Vickers English tires at $122.

An experiment the oflighting of a passenger train with incandescent electric lights was recently made in Germany, concerning which local papers give the following information : The train consisted of three cars. A dynamo-electric machine, constructed for this purpose by Möhring of Frankfort, and the other electrical apparatus were placed in the baggage car. A belt pulley under the car was set in motion by the car-axle, which motion was transmitted by a belt to the dynamo-electric machine. The speed of the train was 31 miles an hour. The electric lamps were so distributed that there were seven in each of the two passenger cars and two in the baggage car. One through car was lighted like a drawing-room, and in the other each compartment was lighted by a lamp in the roof. The light was brilliant and perfectly uniform, and, in spite of the number of lights, pleasant to the eye, and not dazzling. In the farthest corner of a compartment printing in pearl type (next to the smallest used) could be read very well, and even lead-pencil notes. Half the light, it is said, would have been enough. It is also reported that the excess of electricity generated served to light the train while standing still at stations.

The direction of one of the Prussian state railroads has introduced a card for the use of shippers in ordering cars. It is printed on the back of a card like a postal card, and has columns with the following heads : Number of cars wanted ; kind of cars ; kind of freight ; destination ; capacity of car ; day on which cars will be loaded ; remarks. There are some instructions printed on a coupon attached to the card, as that the road is not bound to receive the freight before it can forward it; that cars should be ordered at least three days before they are to be loaded ; that the road may require a deposit of $1.50 for every car ordered ; and other notices as to requirements, cautions, etc. The cards are *sold* at all stations on the road at about ¼ cent each. In Germany the shippers generally load the cars themselves, there being a very much higher charge for shipments of single packages delivered at the stations for the road to load.

The Russian narrow-guage Livny Railroad, of which so much was said in connection with the Fairlie locomotive some ten years ago, has been found to give a great deal of trouble on account of its exceptional gauge, and the Minister of Communications has had estimates made of the cost of changing it to the Russian standard (5 ft.). The estimate is $1,112,500, the road being 38 miles long, which ought to pay for a new road of that length. The change is indefinitely postponed because of the cost. There are three other narrow-gauge roads in Russia, the Novgorod Railroad, 105 miles long, the Jaroslavl & Vologdash, 128 miles, and the Obojani (just opened), 18 miles. The first two, as well as the Livny road, suffer from their exceptional gauge.

The report of the French Minister of Public Works shows that in 1880 182,983 men were employed on the French railroads, of whom 7,815 were engaged in office work, 57,530 in station work, 9,180 as conductors and brakemen, 46,838 as enginemen, firemen and in the shops, and 61,620 in maintenance of road. The average number of employés per mile of railroad is about 12.2. The number on the Massachusetts roads is 7.4 per mile.

In Holland at the beginning of this year there were 1,216 miles of railroad, 625 miles of which belong to the state.

Quaymas and Pacific Through Traffic.

A Pacific outlet is said to be secured by the Atchison, Topeka & Santa Fe Railroad by its purchase of the Sonora Railroad, which is to cross the northwestern corner of Mexico, and which has its terminus not on the Pacific but on the Gulf of California, 250 miles south of the United States border, 400 miles from the junction of the Gulf with the Pacific, and 1,700 miles by sea from San Francisco, the vessels going 1,300 miles southeast to turn the southern extremity of the Gulf of California, and then sailing northwest 400 miles. So far as obtaining San Francisco traffic is concerned, a terminus at Guaymas is about equivalent to a terminus at Pensacola for obtaining New York freight. A voyage 500 miles (30 per cent.) longer than that from San Francisco to Guaymas will take a vessel from New York to Vera Cruz or Panama. From San Francisco to the Mexican port of Mazatlan the distance is about 200 miles less than to Guaymas, and to Manzanillo the distance is about the same as to Guaymas, Mazatlan being 400 miles and Manzanillo 800 miles down the coast (southeast) from Guaymas. The distance by rail to Guaymas from this direction is a little less than the distance to San Diego, several hundred miles less than the distance by the southern route to San Francisco, and about 300 miles shorter from Chicago or the Missouri River than the route to San Francisco by the Union and Central Pacific roads. People talk of the Pacific trade as if it could be secured at any point on the Pacific coast, which is as reasonable as to assume that railroads with termini at Halifax, New York, Savannah, and New Orleans would have equal opportunities for securing the traffic of the Atlantic coast—indeed, less so ; for a very large amount of the Atlantic traffic crosses the ocean and can be taken to any port which offers advantages for communication with the interior, while only an insignificant part of the Pacific traffic crosses the ocean ; nearly all going east is produced on this continent and nearly all going west is consumed on this continent. We have proved this repeatedly by reference to the published statements of the through shipments over the Central Pacific, which are given item by item in its reports. In 1880 the only imports of any importance carried east by the Central Pacific were tea, amounting to 11,736 tons, or to 37½ tons a day, and about *one-ninth* of the total through shipments of the road which at that time had all the through traffic.

The through freight eastward originates chiefly in California. Oregon supplies about 3,500 tons of wool and 7,500 of salmon ; Mexico substantially nothing ; Australia next to nothing ; Asia, the tea. To share in the tea traffic, it will be necessary to put on steamer lines to the new termini, whether at Puget Sound, Portland, San Diego, or Guaymas. One or two steamers a month now do not find the business so large or profitable as to induce an increase in the service.

The Guaymas line of the Atchison, Topeka & Santa Fe will afford it little traffic of a new kind, but must depend chiefly, like the lines of the same company in New Mexico and Arizona, on the traffic supplied by the country near it It passes in the vicinity of many mines, and the point at Guaymas will make it, doubtless, the best line of supply for many other mines on the Pacific coast of Mexico, which now have to pay immense freights on their machinery and supplies, depending largely on the Pacific steamers. These will not afford a large amount of freight, but they can usually pay very high rates, just as the mines in Colorado and Arizona have done. But the diversion of any appreciable part of the present Pacific through freight to a port situated like Guaymas is next to impossible.

Loads Which Locomotives Will Haul.

At the request of some of the persons who appeared before the Trunk Lines Advisory Commission, calculations were made of the loads which locomotives would haul on different grades and curves. The following table gives the result of these calculations, which may be of interest to some of our readers at the present time, when the influence of grades and curves in the cost of transportation is being discussed so much.

The calculations are for three types of engine, designated in the column titles as Type "A," Type "B" and Type "C," these being as follows:

Type A.—American locomotive with four driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being 36 tons.

Type B.—Mogul or 10-wheeled locomotive, with six driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being about 42 tons.

Type C.—Consolidation locomotive with eight driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being about 54 tons.

Weights of Train which Locomotives can haul at a speed of 20 miles an hour under Ordinary Conditions, in Tons of 2,000 lbs. (not including the weight of Engine and Tender).

	Type of Locomotive.		
	Type "A."	Type "B."	Type "C"
On straight track :			
Level	1,096	1,664	2,226
Grade 20 ft. per mile	547	840½	1,128
" 40 " " "	350	545	734
" 60 " " "	249	390½	522
" 80 " " "	188	302	410
" 100 " " "	148	242	330
On 5-degree curves :			
Level	921	1,401½	1,876
Grade 20 ft. per mile	464	716	962
" 40 " " "	310	485	654
" 60 " " "	227	360½	488
" 80 " " "	173	279½	380
" 100 " " "	137	225½	306
On 10-degree curves:			
Level	662	1,013	1,358
Grade 20 ft. per mile	401	621½	836
" 40 " " "	278	477	590
" 60 " " "	207	330½	448
" 80 " " "	160	260	354
" 100 " " "	128	212	290

* Under the most favorable conditions loads about 50 per cent. greater than those given above may be hauled.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows :

Buffalo, Pittsburgh & Western.—Extended northeast to Kinzua Bridge, Pa., 6 miles.

Carson & Colorado.—Extended from Soda Springs, Nev., to Candelaria, 15 miles. Gauge, 3 ft.

Denver & New Orleans.—Track laid from Denver, Col., southward 79 miles.

Galveston, Harrisburg & San Antonio.—Extended from Uvalde, Tex., west by north to Eagle Pass Junction, 47 miles. The *El Paso Division* is extended from Marfa, Tex., southeast 40 miles.

Kansas City, Lawrence & Southern Kansas.—Extended from Olathe, Kan., northeast to Turner, 17 miles.

Leavenworth, Topeka & Southwestern.—Extended from Stranger Creek, Kan., west 8 miles.

Shenango & Allegheny.—Extended from Shenango, Pa., to Greenville, 2 miles.

This is a total of 214 miles of new railroad, making 823 miles thus far reported for 1882, against 427 miles reported at the corresponding time last year, 733 miles in 1880, and 204 miles in 1879.

THE BEAR SPECULATION IN WALL STREET has received a check in a manner wholly unprecedented—namely, by Mr. Jay Gould's exhibiting part of his wealth to a few of his friends in order that they might certify to the public as to his great resources. Mr. Gould and his associates have been credited with being bulls for a year past. The assumption was that they had accumulated many millions of stocks before last July which they expected to dispose of at higher prices in July and thereafter. But what with the shooting of the President and the bad harvests the higher prices did not come, and have not come yet; on the contrary, Western Union, which was 94 in June, sold for 76¼ last Saturday, Wabash common had fallen from 60 to 31, Wabash preferred from 95 to 55, Missouri Pacific from 114 to 88, Missouri, Kansas & Texas from 53 to 27, Texas & Pacific from 73 to 53, New Jersey Central from 104 to 78. That Mr. Gould and his associates bought at the highest prices however, none but a very innocent speculator would assume; and to believe that they have held on to all the stocks which they have been manipulating at any time would doubtless be a great mistake. But those familiar with the market know that since last June it has been very difficult to market any very large amount of securities even at the lowest of the lower prices that have ruled since then, and they have therefore naturally supposed that those who "loaded up" before July for the purpose of selling have been having a pretty hard time since, and they have been confirmed in this opinion by the fact that these holders have not sustained the prices of their stocks. For the latter course two explanations were at hand: the large holders might believe that the low prices are all their stocks are worth and all that they are likely to get for them now or later, and so unload, as the best thing left for them to do; or they might be so crippled in means by the great decline as to be unable to keep prices from going far below the actual value of their stocks. If they possessed abundant means, beyond what is needed to carry their present holdings, we should expect them to be as glad as the rest of us are when a chance of a good bargain is offered, and so to welcome the low prices as an opportunity of increasing their wealth. They should be buying up all the stocks worth 100 that are selling at 80, and not feel the slightest desire for an advance until they have used all their spare capital.

Now what Mr. Gould did was to exhibit some $53,000,000 par value, worth more than $40,000,000 at present market prices, of stocks which have not been hypothecated and on which, therefore, he can borrow money any day—can borrow, probably, $30,000,000 to $35,000,000; besides which he is said to have had $20,000,000 or more of bonds, etc., which he did not exhibit. This showing was a satisfactory answer to the charge that Mr. Gould was in financial trouble, but it seems to us to reflect very unfavorably on his financial sagacity, if, as is represented, he believes that Western Union is worth and will soon sell for par instead of 78, and that Missouri Pacific is worth 130 to 150 instead of 90. A truly shrewd speculator would not have had these millions lying idle in his vaults, but would have borrowed money on them and bought other tens of millions of stocks on which there is a sure profit of 25 per cent. or more. It looks as if there were a chance to make eight or ten millions here, which ought to be worth even Mr. Gould's while. But perhaps he is tired of money-making and has some friends not so well provided for and who have stocks to sell. There is something touching in such affection for one's friends.

CHICAGO SHIPMENTS EASTWARD during the week ending March 4 were 48,681 tons, against 47,928 tons the previous week. This is very different from the course of the shipments billed from Chicago (not including shipments from the West through Chicago) reported by the Board of Trade, which showed a *decrease* of 4,537 tons, instead of the increase of 753 tons in the total shipments shown above. For three successive years the total Chicago shipments in this week ending March 4 have been:

	1880.	1881.	1882.
Tons	54,355	28,085	48,681

Here it appears that the shipments were 74 per cent. greater this year than last; but the week last year was wholly exceptional, snow blockades having made them about 25,000 tons less than the week before or the week after, and much smaller than in any other week of the entire year. The shipments this year were 14.4 per cent. less than in 1880. The March shipments in 1880 were larger than in any other month reported except last January. In 1880, however, the grain rate was 35 cents per 100 lbs.; in January last, 10 to 12½ cents; up to this week this month, 20 cents. The March shipments this year will probably make a very bad showing in comparison with 1880, and be decidedly smaller than last year, when they were but moderately large. We should expect to see them reduced somewhat by the advance in rates which took place last Monday, and if not by that, then by the very light receipts at Chicago, which so far high prices have not mended.

Of the shipments of the week ending March 4, this year, the Chicago & Grand Trunk carried 11.2 per cent., the Michigan Central 27.8, the Lake Shore 14.8, the Fort Wayne 32, the Pan-handle 8.6, and the Baltimore & Ohio 5.6 per cent. Here the notable features are the very small percentage of the Lake Shore and the very large one of the Fort Wayne. The week before the Lake Shore's percentage was small also, but then it was the Michigan Central and not the Fort Wayne that had an exceptionally large proportion. The last week the two Vanderbilt roads had 42.6 per cent. of the whole, against 49 in the old pool, and the two Pennsylvania roads 40.6 per cent. of the whole, against 33 in the pool.

For the week ending March 11 the Chicago Board of Trade reports the shipments billed from that city (given in the Chicago *Tribune*) to have been 30,565 tons, against 35,154 tons the week before, and 31,355 in the corresponding week of last year, when they were greatly reduced by the snow blockade. The shipments of last week should have been stimulated by the announcement of the advance in rates this week; but against that was a "bull" market in Chicago, making prices higher there than in New York, comparatively. Of the shipments last week 9,121 tons were flour, 13,819 grain and 7,625 provisions. An unusually large proportion of the shipments was by the Fort Wayne, including 30⅕ per cent. of the grain, of which heretofore it has usually had a small share. The two Pennsylvania roads had 55.2 per cent. of the provisions; the two Vanderbilt roads 32.7 per cent.; but the two Vanderbilt roads had 47.3 per cent. of the grain and flour, and the Pennsylvania roads only 38 per cent., notwithstanding the unusually large proportion secured by the Fort Wayne. There is a very large increase in the flour shipments this year, and they make up 30 per cent. of the whole, while last year they were less than 23 per cent.

THE ERIE CANAL TRAFFIC in the season of 1881 is reported by the Canal Auditor to have been nearly 20 per cent. less than in 1880, and the tolls received from it 45 per cent. less. The "traffic" referred to is the number of tons, which is especially misleading for these two years, for there was a very great diminution in the tonnage going through the whole length of the canal from Buffalo to Troy (chiefly grain), and an increase in some heavy items like coal and iron ore, which for the most part are carried much shorter distances, and this is reflected by the 45 per cent. reduction in the tolls received, only a comparative part of which was due to the larger number of articles on the free list.

The Auditor's statement, showing a decrease from 6,457,656 to 5,179,192 tons in the canal freight, is accompanied by another showing an increase of 1,058,341 tons on the New York Central Railroad and of 2,370,931 on the Erie, and there seems to be some feeling that the railroads should not have so much more freight than the canal. There is, however, little room for comparison of the total tonnage of the canal and the railroads. In the first place either of the railroads has twice the length of the canal system, and has twice as much country to depend upon for local freight. How important this is may be inferred from the fact that the Erie's coal traffic last year was 5,518,000 tons, and this traffic, though not originating on its line, is local in the sense that its location along the border of anthracite coal field is what gives this traffic to it rather than to the canal.

It is true, however, that the railroads last year obtained a part of what the canal lost—a part, not all. The truth is that the canal traffic was wholly unprecedented in 1880, and though there was so great a decrease last year, the canal then carried but 3.4 per cent less then in 1879, and *more* than in any previous year. It was certainly a very unprofitable year for the boatmen, but the canal traffic was not small.

What the railroads did last year was to take from the canal a considerable amount of grain that would have gone by canal if rail rates had not been below cost. But the canal would not in any event have carried as much grain in 1881 as in 1880, for the railroads themselves, after diverting grain from the canal by their low rates, still carried less than in 1880. The total New York receipts having been 30,652,000 bushels less, the canal must have suffered part of the loss.

It is a legitimate subject of complaint by the owners of canal boats, however, that their business was spoiled last year by the action of the railroads in carrying for less than cost. They must bear all the competition that arises from improvements lessening the *cost* of transportation, but when the price is put below the cost, they may properly cry out and ask for protection.

FEBRUARY EARNINGS have been reported so far by 48 railroads with 40,853 miles of road this year, against 35,775 last year. Their aggregate earnings were $16,729,238 this year, against $12,716,111 last year. The increase in earnings was 31.6 per cent.; the increase in mileage 14.2 per cent., and the average earnings per mile of the roads reporting increased from $355 to $409, or 15.2 per cent. February last year was a month of unfavorable earnings for many roads, traffic in the Northwest especially being greatly interrupted by snow. This year February was an unusually favorable month to the Northwestern roads, the grain movement in the first three weeks of the month being unusually heavy for winter (though less than in January), and the lumber shipments—the chief westbound freight—fully twice as great as last year. Our table last year, including several other roads and much more important ones than have reported as yet this year, showed a decrease in average earnings per mile of 10 per cent., compared with 1880.

The reports so far are chiefly from roads with comparatively light traffic, as may be seen from the fact that notwithstanding their large increase their average earnings per mile were but $409. The roads reporting in our January table had average earnings of $603 per mile.

Of the total increase in earnings of $4,013,127 by the 48 roads that have reported for last February, $2,663,324 was made by 15 Western roads which last year were greatly troubled with snow, and which are now working 2,336 miles more road than then. Last year was positively bad for them, while this year has been positively good for most roads which have been able to obtain full rates, with the exception of Southern roads west of the Mississippi, and some lines in other parts of the country where the crops were worst last year. There is, however, an improved traffic from many parts of the country where the crops are much lighter than last year, due not only to the more favorable weather, but to the fact that an extraordinarily large proportion of their crops was marketed in February. The light traffic in the fall and in December was followed by an altogether unprecedented movement in January, which continued through most of February, but has been succeeded already by another period of dullness. Heavy west-bound shipments, especially of lumber, continue, however, and in view of the interruptions to traffic in March last year, the comparisons will doubtless be very favorable.

THE BREADSTUFFS EXPORTS are reported by the Bureau of Statistics to have been in February, from the whole United States, of the value of $11,173,239 this year, against $13,919,046 last year. The decreases at Atlantic ports were largely counterbalanced by increases at San Francisco and Portland, Or., and the much smaller quantities of corn and wheat by the much higher average values of these grains. The percentage of decrease in values was 24.6 per cent. in February, 24.6 per cent. for the two months ending with February, and 35 per cent. ($57,132,000) for the eight months ending with February.

The decrease in bushels exported for the two months is shown below (flour reduced to bushels):

	1882.	1881.	Decrease.	P. c.
Flour	4,541,535	5,869,080	1,327,545	22.6
Wheat	12,090,694	15,870,572	3,779,878	23.8
Corn	4,077,845	7,139,277	3,061,432	42.9
Other grains	366,129	581,110	214,981	37.0
Total	21,076,203	29,460,039	8,383,836	28.5

In February no less than 43.4 per cent. of the wheat exports were from San Francisco and 8.8 per cent. from Portland, Ore., so that more than half went from the Pacific coast. New York exported 29.5 per cent. of the whole, Baltimore 10.9, Philadelphia 4.9, and Boston only 2 per cent., the other 0.5 per cent. going from four different ports, but chiefly from New Orleans. The flour exports were very different, the two Pacific ports together shipping but 26.8 per cent. of the whole, New York 47.7, Boston 13.1, and Baltimore 5.3, the other 7.1 per cent. going chiefly by way of Richmond and Port Huron. Of the corn New York exported 67.4 per cent., Boston 16.7, Baltimore 7.5, and Philadelphia 5.9 per cent., leaving but 2.5 per cent. for all the other ports.

If the name of New Orleans is missed here, it is because its exports were entirely insignificant. They were 0.5 per cent. of the total value in February, and 0.4 in the two months; while last year they were 4.7 per cent. in February, 4.6 in the two months, and 4.3 per cent. in the eight months.

The decrease in the values of its exports has been:

	1882.	1881.	Dec.	P. c.
February	$59,526	$650,070	$590,544	90.8
Two mos. to Feb. 28	90,710	1,320,854	1,230,144	93.2
Eight mos	2,439,679	7,897,860	5,458,181	69.1

For the two months ending with February the exports of New York and Boston (values) were 52.2 per cent. of the whole this year against 49.2 last; those of Philadelphia and Baltimore were 13.9 per cent. this year, against 27 per cent. last year.

THE OFFICIAL RECOMMENDATION OF SIGNAL SYSTEMS made by the present French Minister of Public Works to the railroad companies of France, whose lines and operations are closely inspected by the officers of this Minister, is more definite in condemning some and recommending other appliances than any other government document that we have ever seen. It is not necessary to point out the very grave dangers connected with such an exercise of authority, tending as it does to take away responsibility from the officers who work the roads and enabling them to throw it upon the government. All that saves it from being absurd and outrageous is, first, the close supervision of the railroads by the government from the time of their first location, so that it is to a great degree responsible already for their construction and equipment; and, second, the existence in France of a very large and thoroughly trained technical corps of high character, largely engaged in working the railroads for the companies, as well as in inspecting them for the government, of which corps the Minister of Public Works is the official head. Thus, in a sense, the experience of the whole railroad system of France may be said to be the experience of the Department of Public Works, which through its own subordinates must reflect very closely the prevailing opinion and the best judgment of the men who work the French railroads. Nevertheless, it remains dangerous for the head of a government department to give his official endorsement to patented appliances which involve great pecuniary interests; and it is likely to be more dangerous now than heretofore in France, because under the republic the cabinets are so short-lived. Not only will a man be likely to be more careful of his reputation in a commanding position which he is likely to hold five or ten years, than if his probable term of office is but a few months; but the very number of the ministers holding short terms increases the danger that

some one may chance to get the place who is less careful of his reputation than to secure a fortune before his term expires.

OPENING LAKE RATES are already reported. The Chicago *Tribune* says that several charters have been made for carrying corn from Chicago to Buffalo at 2½ cents a bushel; last year the opening rate (opening May 3) was 4½ cents; the year before (opening April 3), it was 6 cents. Of course it is possible that by the day of opening the rate will be changed; but it is hardly likely to be higher, for there are a great many vessels and not as much grain as usual. With a canal rate of 5 cents a bushel, and the usual Buffalo transfer charges and insurance, this will make the cost by water from Chicago to New York about 8½ cents a bushel. Last January and most of the time after harvest last year, the railroads carried for 5 6 to 7 cents a bushel; now they charge 14 cents. They will not get much export grain with such a difference, but they will get most of the other grain, and substantially all the flour and provisions, and there is not going to be much export grain. There has been a large increase in lake marine within a year, but such opening rates as 2½ cents will discourage the construction of new vessels; as the result of last season's business is said to have done, though then rates for carrying coal greatly swelled the receipts of the vessels engaged in the grain trade.

FOREIGN IMMIGRATION begins much heavier this year than last, but it is always comparatively light in the first half of the year. In February the number arriving was 28,247, against 15,075 in February last year; but the average monthly arrivals were 60,000 last year. The heaviest immigration is usually in the spring months, especially in May. We hear that the sales of orders for tickets this winter have been altogether unprecedented, and one of the German lines is preparing to dispatch three or four steamers a week from Hamburg, increasing from the usually weekly steamer mainly to accommodate this traffic. There is every prospect that the immigration this year will be much the largest ever known, especially from Germany, and this will have a very considerable effect on railroad and other business.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Denver & Rio Grande, annual meeting, at Colorado Springs, Col., April 3. Transfer books closed March 14.

Pennsylvania, annual election, at the general office, No 233 South Fourth street, Philadelphia, March 28. The polls will be open from 10 a. m. to 6 p. m.

Chicago & Alton, annual meeting, at the office in Chicago, April 3, at 10 a. m. Transfer books closed March 13.

South Carolina, annual meeting, at the office in Charleston, S. C., April 5, at 1 p m. Transfer books closed March 10.

Toledo, Cincinnati & St. Louis, meeting to organize the consolidated company, in Toledo, O., March 21.

Railroad Conventions.

The *National Association of General Passenger & Ticket Agents* will hold its annual meeting in New York, at the rooms of the Railroad Club, No. 46 Bond street, beginning on Tuesday, March 21, at 11 a. m. Blank credentials will be furnished new members at the meeting.

A *Ticket Commission* meeting has been called by Chairman W. H. Dixon in pursuance of the resolutions passed at the meeting held in Chicago, Feb. 15 last. The meeting will be held at the Railroad Club Rooms, No. 46 Bond street, New York, March 22, at 11 a. m., and all railroad companies are requested to send representatives.

Dividends.

Dividends have been declared as follows:

Union Pacific, 1¾ per cent., quarterly, payable April 1. Transfer books close March 13.

Chicago & Northwestern, 1¾ per cent., quarterly, on the preferred stock, payable March 28. Transfer books close March 15.

Lehigh Valley, 1½ per cent., quarterly, payable April 15. Transfer books close March 18.

Chicago, Milwaukee & St. Paul, 3½ per cent., semi-annual, on both the common and the preferred stock, payable April 15.

Chicago, St. Paul, Minneapolis & Omaha, 1¾ per cent., quarterly, on the preferred stock, payable April 20. Transfer books close March 31.

Foreclosure Sales.

The *Savannah, Skidaway & Seaboard* road was sold in Savannah, Ga., March 7, under a decree of foreclosure granted by the Georgia Superior Court. The road sold for $75,500 and some personal property for $1,550, the purchaser being Jacob Rauers, of Savannah. The road is used chiefly for suburban and pleasure travel, and extends from Savannah to Isle of Hope, with branches to Montgomery and White Bluff, 11 miles in all. There is also a street line 2½ miles long in the city. The bonded debt was $100,000.

Trunk Lines Advisory Commission.

On March 9 the Advisory Commission heard arguments against any difference in rates to seaboard points from a committee of the New York Chamber of Commerce. The arguments were presented by Messrs. Charles S. Smith, George W. Lane and others.

On March 10 the Commission made a trip of inspection to various points in New York and the harbor, to see the terminal facilities provided there. After the trip an argument was heard from Mr. E. H. Walker, Statistician of the Produce Exchange, which was chiefly based upon the claim that the longer distance to New York was more than offset by the heavier grades of the lines to Philadelphia and Baltimore.

The Commission held its first session in Philadelphia, March 14, when the Committee on Inland Transportation appeared for the Board of Trade, the chief argument being made by Mr. I. W. Morris. His argument was based on the shorter comparative distance from the Western traffic centres to Philadelphia, and he showed that the Pennsylvania road, in spite of alleged disadvantages of grades, etc, had been able to carry freight at smaller cost than the New York Central. His claim was that Philadelphia is entitled to the full benefit of its geographical situation.

At the hearing on the 15th a memorial of the Commercial Exchange on the subject of differential rates and terminal charges was read by Mr. L. W. Barker. The points claimed on the part of the Exchange may be summed up as follows:

"1. That railroad elevator charges for transfer and storage should be equal at all seaboard points.

"2. That differential allowances in favor of Philadelphia and Baltimore, as compared with New York in every aspect in which they may be considered, are not only founded upon principles of justice, but are necessary for the competitive efficiency of all the ports and lines.

"3. That these differences, to fully satisfy a fair balance between these ports, should be in the relation of say 4.7 cents per 100 pounds higher to New York than to Philadelphia.

"4. That the relations of Philadelphia and Baltimore should be the same. While we are aware that hitherto a difference of 1 cent per 100 pounds has been made against Philadelphia, we claim that the points presented in this memorial disprove the equity of such allowances, and that the history of the trade of the two ports, showing the large relative decadence in that of Philadelphia, clearly proves this difference to have been inexpedient. We claim, however, that this equality should be adjusted, not by reducing the Baltimore difference to the level of Philadelphia, as both are already too low in comparison with New York, but by advancing Philadelphia to parity with Baltimore."

The Committee on Transportation of the Grocers' and Importers' Exchange presented a memorial to the commission claiming that Philadelphia should be accorded her fair share of the export trade of Western produce. This was followed by some discussion as to the cost of carrying freight over different roads.

Engineers' Club of Philadelphia.

The regular monthly meeting was held on March 4, President Rudolph Hering in the chair; twenty-five members and one visitor present.

The Secretary presented, on behalf of Mr. Thos. U. Walter, honorary member, a description of his experiments in 1836–37 upon the effect of extreme temperatures upon iron bands imbedded in the walls of Girard College, Phila., of which he was the architect. These bands, each 54 ft. long, were introduced to resist the lateral pressure of the arches. Although confident that no evil could result therefrom, Mr. Walter considered the positive evidence of these experiments both satisfactory and interesting. The south vestibule wall, 5 ft. 5 in. thick, subjected to the full power of the sun during summer and in winter under temporary roof, with no fires in furnaces, was selected for experiment. Self-registering thermometers, minimum for winter and maximum for summer experiment, were placed upon the band and the whole walled in as finished work. The following changes, in Fahrenheit degrees, took place:

Sept. 23, 1836. July 29, 1837.	82°	Intermediate extreme cold—3°. Minimum temperature in middle of wall, 42°.
Jan. 16, 1837. Dec. 16, 1837.	24°	Intermediate extreme heat, 94°. Maximum temperature in middle of wall, 61°.

Difference of temperature outside of wall, 97°. Difference of temperature in middle of wall, 19°.

Smeaton's co-efficient of expansion for malleable iron, $\frac{1}{785}$ of length for 180°, being somewhat greater than that of other experimenters, was used. The co-efficient for brickwork, $\frac{1}{1458}$ of length for 180°, was taken from experiments by A. J. Adie, C. E. (Royal Society of Edinburgh, April 20, 1835).

The difference occasioned by a change of 19° in temperature in a length of 54 ft. is, therefore, less than $\frac{1}{20}$ in., but if we consider that the exterior of the wall is subjected to the extremes of heat and cold, it will be obvious that the aggregate change of the brickwork is even greater than that of the iron.

Mr. George P. Bland read a paper upon the practical strength of wrought iron columns, giving formulæ and diagram, and arguing that the factor of safety should be established with reference to the limit of elasticity.

Mr. Howard Constable exhibited a blue copy of the Kinzua viaduct, and stated that its height will be 300 ft. and length 2,000 ft.

Mr. Henry G. Morris described the Hotchkiss mechanical boiler cleaner, which consists of a spherical cast iron vessel placed above the boiler, which it enters by a vertical flow pipe bent at right angles just below low water line and opening there in tunnel form; also by a return pipe carried nearly to the bottom of the boiler. The sediment, rising invariably to the surface before being deposited on the bottom or flues, is carried into the funnel, by the circulation of the water from front to rear of boiler, and reaches the spherical vessel, where it is deposited; the water returning to the boiler by natural circulation. The sediment is removed from the cleaner by opening the valve in a pipe connected with the bottom thereof, after closing the valves in the flow and return pipes.

The Secretary presented a paper by Mr. P. H. Baermann upon "What Thickness of Metal should be given to Cast Iron Pipes under Pressure?" The various formulæ are reduced to the same notation, classified and compared, and illustrated by numerous diagrams. The quality of iron, practical difficulties in casting, minimum strength required for handling, the static head, force of ram and of rapid closing of gates or hydrants and allowance for deterioration, are considered at length. A table of one-fifth ultimate strengths is given. One of the main facts derived from the comparison is, that the thicknesses, obtained from the formulæ, give pipes of varying strength when calculated for a given head, and that the least thickness necessary to cover imperfections in casting and for safe handling is ample for pipes of small diameters under all ordinary heads.

ELECTIONS AND APPOINTMENTS.

Atlanta & Charlotte Air Line.—At the annual meeting in New York, March 8, the following directors were chosen: Wm. H. Fogg, James E. Grannis, Richard Irvine, Jr., Eugene Kelly, R. A. Lancaster, B. R. McAlpine, P. P. Dickinson, Hiram Sibley, H. W. Sibley, Robert Stobo, Skipwith Wilmer, James H. Young. The board re-elected H. W. Sibley President. The road is leased to the Richmond & Danville Company.

Boston & Bangor Steamship Company.—The officers of this company are: President, William H. Hill; Treasurer, William H. Hill, Jr.; Superintendent, James Littlefield; Chief Engineer, James Hathorn; General Freight Agent, Calvin Austin. Offices in Boston.

Carolina Central.—Major John C. Winder has been chosen General Manager. He is also General Superintendent of the Raleigh & Gaston and the Raleigh & Augusta Air Line, and will now have charge of the whole line from Weldon to Charlotte and Wilmington.

Mr. W. W. Chamberlayne, of Norfolk, Va., has been appointed Financial Agent.

Chattahoochie & East Pass.—This company was organized at Bainbridge, Ga., Feb. 24, by the election of the following directors: W. S. Chisholm, Wilkis Clary, Henry M. Drane, H. S. Haines, W. P. Hardee, D. M. Monroe, B. E. Russell. The board elected H. S. Haines President; W. P. Hardee, Secretary and Treasurer. The company is controlled by the Savannah, Florida & Western.

Chicago & Kansas City Air Line.—The directors of this new company are: Elias Morris, George S. Hardenbrock, Robert L. Martin, Frank H. Dickey, Horace F. White, Chicago; John A. Leslie, New York; John M. Davies, San Francisco.

Cleveland, Tuscarawas Valley & Wheeling.—At the annual meeting in Cleveland, March 8, the old board was re-elected, as follows: W. W. Holloway, E. P. Rhodes, Bridgeport, O.; H. B. Perkins, Warren, O.; Clement Russell, Massillon, O.; Selah Chamberlain, James Mason, R. P. Myers, Amasa Stone, W. S. Streator, Cleveland, O.

Denver & Rio Grande.—The following circular is dated Denver, Col., Feb. 28: "G. W. Cushing having resigned the position of General Superintendent of this company, all reports and communications heretofore addressed to the General Superintendent should be addressed to George W. Ristine, Assistant General Manager, Denver, Col. To take effect March 1, 1882."

Florida Central & Western.—This company has been organized as successor to the Florida Central and the Jacksonville, Pensacola & Mobile, with the following directors: Arthur D. Bissett, James M. Schumacker, Jacksonville, Fla.; John L. Inglis, Madison, Fla.; R. H. Gamble, Tallahassee, Fla.; C. S. Hinchman, Wayne McVeagh, Philadelphia; Leonidas M. Lawson, New York: Sir Edward J. Reed, London, England; H. F. R. Hubrecht, Amsterdam, Holland. The board has chosen Sir Edward J. Reed, President; W. T. Roby, Treasurer; W. M. Davidson, General Manager.

Galesville & Mississippi.—The officers of this new company are: President, A. A. Arnold; Vice-President, Isaac Clark; Secretary, G. Y. Freeman; Treasurer, A. H. Kneeland. Office at Galesville, Wisconsin.

Indianapolis & Evansville.—Mr. Josephus Collett has been appointed Receiver of this company, on application of the creditors.

Kansas City, St. Louis & Chicago.—At the annual meeting in Chicago, March 14, the following directors were chosen: George Straut John J. Mitchell, W. H. Mitchell, H. J. Higgins, George M. Shelley, John M. Woodson, R. P. Tansey, P. H. Rhea, Thomas Shackelford. The board elected John J. Mitchell President; R. P. Tansey, Secretary. The road is leased to the Chicago & Alton.

Metropolitan-Manhattan Railway Mutual Aid Association.—At the annual meeting in New York, March 8, the following officers were chosen: President, R. L. Sloan; First Vice-President, E. H. Haswell; Second Vice-President, J. Marshall; Secretary, J. Trueman; Treasurer, O. D. Holman; Sergeant-at-Arms, J. Steele; Executive Committee, E. Cleary, T. Sullivan, H L. Browne, J. Charlton, W. G. Bragg.

Norfolk & Western.—The following circular is dated March 13: "In addition to the officers appointed by the board of directors Jan. 11, 1882, the following appointments have this day been made and confirmed: Charles P. Hatch, General Freight Agent, with office at Lynchburg, Va.; W. W. Coe, Chief Engineer, with office at Roanoke, Va.; George Hoffman, Engineer Maintenance of Way, with office at Lynchburg Va.; W. C. De Armond, Purchasing Agent, with office at Philadelphia, Pa.; J. B. Gregory, Storekeeper, with office at Petersburg, Va.; N. M. Osborne, Superintendent Eastern Division, with office at Petersburg, Va.; Frank Huger, Superintendent Western Division, with office at Lynchburg, Va."

Oil City & Chicago.—The officers of this new company are: President, J. W. Jones, Philadelphia; directors, Clarence H. Clark, B K. Jamison, H. M. Sill, H. Blake Tyler, George F. Tyler, Philadelphia; Archer V. Martin, Summit, N. J.; Charles E. Kimball, C. C. Pomeroy, H. A. V. Post, New York.

Peoria & St. Louis Air Line.—The directors of this new company are: E W. Hayes, Bunker Hill, Ill.; W. W. Brown, Waverly, Ill.; Francis Low, Havana, Ill.; John A. Brahm, H. Fischer, H. Hamilton, T. W. McNeeley, J. G. Strodtman, John Tice, Petersburg, Ill. The office is at Petersburg.

Petersburg.—At the annual meeting in Petersburg, Va., March 15, the following were chosen: President, E. T. D. Myers; directors, James Bryan, T. M. Logan, W. H. Palmer, R. G. Pegram, F. R. Scott.

Pittsburgh & East End.—The officers of this new company are: President, W. S. Bissell, Pittsburgh; directors, Wm. L. Chalfant, J. H. Lindsay, W. H. McCaldren, N. M. McDowell, Allegheny, Pa.; Wm. Flynn, Wilson McCandless, H. S. A. Stewart, George I. Whitney, Pittsburgh.

Pittsburgh Junction.—The board has elected E. K. Hyndman President; C. Vankirk, Vice-President; C. P. Ford, Secretary and Treasurer.

Quincy, Missouri & Pacific.—At the annual meeting last week the following directors were chosen: C. S. Bull, Amos Green, F. G. Jameson, C. W. Keyes, Henry Root, Quincy, Ill.; Charles Ridgely, Springfield, Ill.; W. S. Blodgett, T. S. House, Solon Humphreys, New York. The road is leased to the Wabash, St. Louis & Pacific.

St. Louis Bridge.—At the annual meeting in St. Louis last week the following directors were chosen: Gerard B. Allen, Wm. Taussig, Edward Walsh, Jr., Julius S. Walsh, St. Louis; J. Pierpont Morgan, New York.

St. Louis, Iron Mountain & Southern.—At the annual meeting in St. Louis, March 14, the old board was re-elected, as follows: R. C. Kerens, Rufus J. Lackland, St. Louis; Henry Whelan, Philadelphia; F. L. Ames, Boston; Sidney Dillon, T. T. Eckert, Jay Gould, Joseph S. Lowery, G B. McLellan, Henry G. Marquand, Russell Sage, Samuel Shethar, John T. Terry, New York.

St. Louis, Jerseyville & Springfield.—This company has elected directors as follows: Wm. H Fulkerson, Morris R. Locke, Jerseyville, Ill.; Wm. F. Merrill, Chicago, John C. Gault, James F. How, St. Louis. The road is leased to the Wabash, St. Louis & Pacific.

St. Louis & San Francisco.—At the annual meeting in St. Louis, March 14, the following directors were chosen: R. S. Hayes, C. W. Rodgers, St. Louis; Leland Stanford, San Francisco; A. W. Nickerson, Boston; Wm. F. Buckley, James O. Fish, Jay Gould, A. H. Hatch, C. P Huntington, Russell Sage, J. E. Seligman, W. L. Trask, Edward F. Winslow, New York. The new directors are Messrs. Hayes, Stanford, Huntington, Gould, Hatch, Sage, and Trask. They represent the Gould Huntington interest, now the controlling one, in the company.

St. Louis Tunnel.—At the annual meeting last week the following directors were chosen: N. S. Chouteau, Solon Humphreys, Wm. Taussig, A. J. Thomas, Julius S. Walsh. The company owns the western approach to the St. Louis Bridge.

St. Louis Union Depot.—At the annual meeting last week the following directors were chosen: R. S. Hays, J. F. How, D. S. H. Smith, Wm. Taussig, St. Louis; A. H. Calef, Jay Gould, A. L. Hopkins, New York.

Savannah, Florida & Western.—At the annual meeting in Savannah last week the following directors were chosen: Walter S. Chisholm, Henry S. Haines, John H. Estill, Savannah, Ga.; Morris K. Jesup, Michael J. O'Brien, Henry B Plant, Henry Sanford, New York. The board elected Henry B. Plant President; Walter S. Chisholm, Vice-President; Henry S. Haines, General Manager; R. B. Smith, Secretary; W. P. Hardee, Treasurer. There is no change from last year.

Shenango & Allegheny.—At the annual meeting in Greenville, Pa., March 1, the old board was re-elected, as follows: President, A. H. Steele; Vice-President, J. T. Blair; directors, Wm. Acbre, F. H. Oliphant, James Sheakley, F. H. Wells, Paul Wick.

Wabash, St. Louis & Pacific.—At the annual meeting in St. Louis, March 14, the following directors (one-third of the board) were chosen for three years: Charles Ridgley, Springfield, Ill.; George L. Dunlap, Chicago; James F. Joy, Detroit; Sidney Dillon, Solon Humphreys, New York. They are all re-elected.

Waukegan & Western.—The directors of this new company are: S. A. Bradbury, Dewitt V. Erskine, Waukegan, Ill.; R. L. Lyons, George W. Silsby, M. C. Spaulding, Chicago.

PERSONAL.

—Mr. G. W. Cushing has resigned his position as General Superintendent of the Denver & Rio Grande Railway.

—It is reported that the position of President of the New York, Chicago & St. Louis Company has been offered to Mr. D. W. Caldwell, now General Manager of the Pennsylvania Company.

—It is reported that the position of General Superintendent of the Denver & Rio Grande road has been offered to Mr. Henry Wood, formerly President and Superintendent of the Philadelphia & Baltimore Central road.

—Mr. W. K. Reynolds, who died at Lepreaux, N. B., March 9, was a large owner of lumber and milling property. He was one of the builders of the St. John suspension bridge, and one of the first projectors of the Grand Southern road.

—The resignation of Mr. J. C. Rawn as Superintendent of the Western and Springfield divisions of the New York & New England road, was on account of failing health and a desire for out-of-doors employment. Mr. Rawn's present address is at No. 72 Asylum street, Hartford, Conn.

—Mr. Philo C. Calhoun, who died at his residence in New York, March 14, 1882, aged 72 years, was well known as a merchant and bank president. He was also for some time a director of several railroad companies, and acted as a trustee for bondholders in many cases.

—Gen. Wash. B. Blythe, for many years a civil engineer, died in Alexandria, Va., March 2, aged 73 years, the cause of his death being paralysis. He was a native of Adams County, Pa. He was formerly for a number of years General Superintendent and Chief Engineer of the Alexandria, Loudoun & Hampshire (now the Washington & Ohio) road, and later was for several years City Engineer of Alexandria.

—Gen. Wm. W. Wright, a well known civil engineer, died March 9 in Moyamensing Prison, Philadelphia, having been arrested and sent there for habitual intoxication. General Wright was for several years on the Pennsylvania Railroad, and left that road to take part in the survey of the proposed Honduras Interoceanic road. During the war he served as engineer with the army of the Potomac, and afterwards with Gen. Sherman, reaching the rank of Brigadier General. He had since been connected with several important works, including the bridges over the Missouri at Leavenworth and Atchison, and lately with the Panama Canal.

—At the regular monthly meeting of the directors of the Baltimore & Ohio Company, held March 8, President Garrett presented the resignation of Mr. John C. Davis as Master of Machinery, tendered on account of ill health. The President stated that Mr. Davis, after serving a regular apprenticeship at the machine business, entered the service of the company in 1840, and, excluding the period when he was in the service of other railway companies, he has, including the period continuously from 1865, been in the service for 30 years. Mr. Davis rose through various grades until he became the esteemed and effective head of that important department. His skill, integrity, fidelity and energy have always commanded full appreciation.

After the remarks of the President the following resolution was unanimously adopted:

"*Resolved*, That this board, in accepting with regret the resignation of Mr. John C. Davis as the Master of Machinery of this company, desires to express its appreciation of the faithful and zealous manner in which he has for so long a period performed the responsible duties of that office, and cordially tenders him, in thus severing his relations with the company, its best wishes for his health and prosperity."

TRAFFIC AND EARNINGS.

Grain Movement.

For the week ending March 4, receipts and shipments of grain of all kinds at the eight reporting Northwestern markets, and receipts at the seven Atlantic ports, have been, in bushels, for the past six years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts
1877	1,500,598	1,041,102	2,719,769
1878	2,883,118	2,341,8.7	3,253,417
1879	2,945,233	1,743,635	4,307,569
1880	3,893,233	2,295,216	3,791,938
1881	2,757,801	1,564,329	3,456,497
1882	1,715,395	1,561,643	1,775,843

The receipts of the Northwestern markets for the week are 1,042,000 bushels (38 per cent.) less than in the corresponding week of last year, which latter were the smallest since 1877. They were nearly the same as the very small receipts of the previous week this year. The shipments of these markets were nearly the same as last year, but smaller than in any other year since 1877, 253,000 bushels (14 per cent.) less than the previous week this year, and the smallest for eight weeks. Of these shipments 175,342 bushels, or 11.2 per cent. of the whole, went down the Mississippi. The Atlantic receipts of the week were smaller than in the corresponding week of any previous year since 1875, and little more than half as great as last year, but they were a little larger than in the previous week of this year.

Of the Northwestern receipts Chicago had 32.2 per cent., St. Louis 22.8, Peoria 18 8, Milwaukee 14.9, Toledo 4 1, Cleveland 2.8, Duluth 2.3, and Detroit 2 per cent. Chicago's receipts were smaller than in any week of 1881 or 1880, and a smaller proportion of the whole than before this year. Milwaukee's receipts keep up very well, but elsewhere receipts are very small.

Of the Atlantic receipts New York had 51.1 per cent., Boston 13.5, New Orleans 12.8, Baltimore 5, Philadelphia 4.5, Portland 2.8, and Montreal 0.3 per cent. The Philadelphia and Baltimore receipts are not equal to half the average weekly consumption of those cities, are much smaller than their very small receipts the week before, and the smallest these places have ever had in any week since 1875, at least, before which we have no record of their weekly receipts. The New Orleans receipts are the largest of this year, but only about one-third of its receipts in the corresponding week of last year.

Exports from Atlantic ports for the week ending March 8 were 56,211 barrels of flour and 1,501,024 bushels of grain this year, against 113,111 barrels of flour and 3,667,058 bushels of grain in the corresponding week of last year. For the week ending March 4, 58 per cent of the exports were from New York, 12.2 from Boston, 9.5 from Baltimore, 5 8 from Philadelphia, 3.3 from Portland, and 1.2 per cent. from New Orleans. The exports from the latter place for the past three months have been less than its receipts in the last week—that is, its receipts are nearly all for domestic consumption.

For the week ending March 11 receipts and shipments at Chicago and Milwaukee were:

	Receipts.		Shipments.	
	1882.	1881.	1882.	1881.
Chicago	802,078	540,839	671,472	501,495
Milwaukee	229,065	37,760	154,449	27,6.9
Both	1,031,143	578,599	825,921	619,154

The receipts of the two places are 78 per cent. and their shipments 33 per cent. more than in the corresponding week of last year. They were, however, extremely light this year—the smallest for an entire year except the previous week. The favorable comparison is due to the fact that last year in this week traffic was almost entirely suspended on some roads out of Chicago and Milwaukee by snow blockades. There were days when not a bushel was received at Milwaukee and very little at Chicago. The higher rates announced for he following week should have stimulated shipments; but they were actually unusually light.

Receipts at four eastern ports in this week ending March 11, were:

Bushels:	New York.	Boston.	Phila.	Balt.	Total.
1882	619,470	189.945	48,439	86,152	944,006
1881	1,224,835	437,200	458,350	919,754	3,040,119
P.c. of total:					
1882	65.6	20.1	5.2	9.1	100.0
1881	40.3	14.4	15.1	30.2	100.0

Philadelphia and Baltimore together had 14.3 per cent. of the whole this year, against 45.3 last year.

San Francisco wheat exports in February were 2,344,533 bushels. For the eight months of the California crop year from July 1 to Feb. 28 the exports were as follows, flour in barrels and wheat in bushels, flour reduced to wheat in the totals:

	1881-82.	1880-81.	Increase.	P. c.
Flour	549,074	443,514	105,560	23.5
Wheat	29,892,215	15,450 192	11,442,023	74.1
Total, bushels	29,637,585	17,667,762	11,969,823	67.7

The chief exports of wheat were to Great Britain, but China and Central America take a considerable part of the flour.

Passenger Rates.

A dispatch from Boston, March 15, says: "At a regular meeting of the New England Ticket & Passenger Agents' Association to-day, an emphatic protest was prepared and forwarded to the trunk lines against their recent requirement that 75 cents be added to all through tickets for transfer charges through the city of New York, without reference to the fact whether the passenger has to transfer or not."

East-Bound Freight Divisions.

A meeting of general freight agents was held at Commissioner Fink's office in New York, March 15, to consider the division of east-bound freight business. Representatives of the Pennsylvania Company, the Baltimore & Ohio, the Lake Shore and the Michigan Central were present. The work done was chiefly preliminary and the meeting was to continue on the following day.

Chicago and Milwaukee Receipts.

For the first week of March receipts have been, for four successive years:

Chicago:	1879.	1880.	1881.	1882.
Grain, bush	2,747,066	3,604 785	1,474,480	1,513,548
Flour, bbls.	159,317	104,926	134,498	208,468
Hogs, No	179,226	245,606	129,945	142,951
Milwaukee:				
Grain, bush	580,913	456,281	136,482	518,009
Flour, bbls	99,884	67,951	36,494	113,618
Hogs, No	9,642	15,140	5,442	9 980

The grain receipts at Chicago are a little larger than last year, but last year they were extraordinarily small, owing to snow. At Milwaukee the grain receipts were positively large, and the flour receipts at both places were larger this year than in any previous year. Reducing flour to wheat the receipts of flour and grain, in bulk, at both places for six successive weeks have been:

Week to	1879.	1880.	1881.	1882.
Feb. 7	2,260,594	1,542,260	2,294,795	3,237,441
" 14	2,223,210	2,164,330	1,939,001	2,670,266
" 21	2,076,013	1,809,716	1,284,932	2,217,955
" 28	1,993,205	2,051,185	2,330,899	1,574,295
March 7	2,147.143	2,324,411	1,147,896	1,706,003
" 14	2,347.240	2,514,610	1,232,530	1,774,941

The receipts were a trifle larger last week than the week before, and 44 per cent. more than in the corresponding week of last year; but 29.4 per cent. less than in 1880 and 24.3 per cent. less than in 1879.

The advance in wheat, due to the corner in Chicago, should have stimulated the marketing of that grain last week, but in fact the wheat receipts were extremely small—only 136,716 bushels out of Chicago's total of 2,451,654 bushels of wheat and flour, while its flour receipts alone were equivalent to 938,000 bushels of wheat. Doubtless bad roads have hindered the farmers somewhat from carrying grain to the country stations, but the general course of the traffic, ever since January, indicates that there is less than usual to be marketed, and that the grain movement will be light until after next harvest.

Southwestern Railway Association.

At a meeting held in Chicago last week the question of old claims and past-due differences was finally settled. All members of the Association are to pay up past differences in cash.

It was decided to renew the pool on lumber traffic, to date from March 1. The question of the proportion in which it is to be divided is to be settled before May 1.

The committee to settle the Nebraska differences being unable to agree, the question was referred to Mr. T. J. Potter and Commissioner Midgely.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1882.	1881.	Inc. or Dec.		P. c.
Two months ending Feb. 28:					
Central Pacific	$3,578,000	$3,0 7,125	I.	$52 ,875	17.0
Chi. & Alton	1,109,927	973,438	I.	136,489	14.0
C., L., St. L. & Chi.	405 478	3.3,969	I.	51,509	14 5
Cleve., Ak. & Col.	65,05.1	62,070	I.	2,951	4.7
Col., H. Vy. & Tol.	378,359	3 ,,670	I.	27,689	7.9
Flint & Pere Marq.	529,2 8	2 5,.62	I.	73 03	29.0
Great Western	721.787	727,0 1	D.	5,234	0.7
Ill. Cent., Ill. lines.	1,115,875	955,132	I.	160,744	16 8
Iowa lines	301,685	20 ,648	I.	101,037	50.3
Ind., Bloom. & W.	371,579	350,976	I.	20,603	5.9
Lake Erie & West.	227,467	193,664	I.	3 ,8 3	17.4
Minn. & St. L.	234,332	8s,700	I.	144,632	163.1
Mobile & Ohio	319,587	44 ,113	D.	121,529	27.6
N. Y. & N. Eng.	4 9,414	363,361	I.	66,053	18.2
Ohio Southern	57,501	.....	.....	.....	.....
Petersburg	52,867	45,9.2	I.	6,955	15.1
St. L., A. & T. H., Main Line	198,746	206,403	D.	7,657	3.7
Belleville Line	119,8.0	135,334	D.	15,474	11.5
St. L. & San Fran.	501,438	3.8,.69	I.	1 0,769	28.3
Scioto Valley	68,.00	43,677	I.	24,5.3	56.1
Tol., Del. & Bur.	144,116	85,578	I.	58 538	68.4
Union Pacific	2,720,951	2,714,539	I.	1,006,412	57.1
Wisconsin Cent.	238,056	191, 09	I.	96,947	50.6
Month of January:					
B. & N. Y. Air Line	$23,023	$20,438	I.	$2,585	12.7
Bur., C. R & No.	252,823	167,750	I.	85,073	50.6
Net earnings	99,115	34,928	I.	64,187	183.4
C., in., S. L. & C.	218,599	182,458	I.	36,141	19.8
Net earnings	99,163	82,280	I.	17,883	21.6
Chi. & West Mich	106,000	83,000	I.	23,000	27 7
Europ'n & N. Am.	36,122	31,.99	I.	4,523	1..2
Net earnings	18 4s8	10,894	I.	7,6 5	6..8
Kan. C., Ft. S. & G	140,000	12 ,000	I.	19,000	15.7
Maine Central	139 512	121 586	I.	17,926	14.7
Phila. & Reading	1,503,075	1,319,1 2	I.	183,943	13.9
Net earnings	584,0 3	499,640	I.	8 ,.03	16.9
West Jersey	53,447	48,549	I.	4,898	10 0
Net earnings	2 ,.10	20,101	D.	1	.....
Wisconsin Central	130,956	89,552	I.	41,404	46.2
Month of February:					
Central Pacific	$1,702,000	$1,454,218	I.	$247,782	17.0
Chi. & Alton	530,480	474,318	I.	56,162	11.8
C., L., St. L. & Ch.	186,879	171,561	I.	15,.68	8.9
Cin., N. O. & T. P.	174,177	158,310	I.	35,867	26.0
Cleve., Ak. & Col.	32,999	29,551	I.	3,448	11 6
Col., H. V. & T.	164,192	152,358	I.	11,834	7.8
Flint & Pere Marq.	165, 21	1 9,883	I.	43,338	36 1
Ill. C., Ill. lines	535,145	443,679	I.	91,466	20.6
Iowa lines	154,242	8 ,820	I.	7,4.2	5.0 6
Ind., Bloom. & W.	175,755	165,.26	I.	10,429	6.3
Lake Erie & W.	98,401	88,485	I.	9,916	11 3
Minn & St. L.	114,906	38,297	I.	76,609	201.6
Mobile & Ohio	158,154	216,767	D.	58,613	27.0
N. Y. & N. Eng.	214,791	173,615	I.	40,176	23 0
Ohio Southern	25,451	...	.....	.....	...
Petersburg	28,922	24,784	I.	2,133	16.6
St. L., A. & T. H., main Line	94,439	101,826	D.	7,387	7.2
Bellevi le Line	55, 80	64,186	D.	9,006	1..9
t L. & San F	244,654	178,234	I.	66,420	37.3
Scioto Valley	33,994	22,916	I.	11, 78	48.2
Tol., Del. & Bur.	68, 38	39.3 9	I.	28,709	73.6
Union Pacific	1,759,863	1,374,740	I.	385,123	28.0
Wisconsin Cent.	157,700	102,157	I.	55,543	54.5
Net earnings	75,179	32,659	I.	42,520	130.1
First week in March:					
Chi & Gr'd Trunk	$36,748	$20,023	I.	$16,725	83.6
Cal. & East. Ill.	34,687	29,746	I.	4,941	16.5
Denver & R. G.	107,483	92,3 9	I.	15,124	16.4
Louisv. & Nashv.	245,.20	212,900	I.	32,020	15.0
Mo. Pacific lines:					
Central Branch	18,127	13,043	I.	5,084	38.3
Int. & Gt. No.	59,164	51,161	I.	8,003	15.7
Mo., Kan. & Tex.	141,375	92,950	I.	18,425	19.8
Mo. Pacific	123,554	99,904	I.	23,650	23.7
St. L., I. M. & So.	132,824	158,968	D.	26,144	16.3
Tex. & Pacific	76,945	71,477	I.	5,468	7.7
Northern Pacific	94,000	38,030	I.	55,970	147.3
St. P., Minn. & Man.	123,000	35,500	I.	87,500	24.7
Wab., St. L. & P.	291,255	213,915	I.	77,340	36.1
Year ending Dec. 31:					
	1881.	1880.			
Cairo & St. Louis	$424,482	$413,688	I.	$10,794	2.6
Net earnings	73,343	82,115	D.	8,77?	10.7
Chi., Bur. & Q	21,176,455	20,454,494	I.	721,961	3.5
Net earnings	10,602,095	11,091,590	D.	489,495	4.4
Paducah & Elkton	545,813	404,901	I.	140,912	34.8
Net earnings	133,381	103,278	I.	30,103	29.2
Month of December:					
Chi., Bur. & Q	$1,905,490	$1,552,018	I.	$353,472	22.8
Net earnings	1,034,291	870,537	I.	164,687	19.0
Union Pacific	1,905,642	.....	.....	.....	.....
Net earnings	882,832	.....	.....	.....	.....

For a number of the figures given above we are indebted to the *Commercial and Financial Chronicle's* advance sheet.

Northwestern Immigrant Rates.

The Chicago, Milwaukee & St. Paul Company has issued a circular giving the following joint through rates for immigrant movables and passengers between Chicago, Milwaukee or Racine and points in the Northwest on its own road, and on the St. Paul, Minneapolis & Manitoba, the Northern Pacific and the Canadian Pacific roads. From the circular the following rates to the more prominent places are taken:

Stations.	Passenger rates.	Car-load movables.
Ada, Minn	$14.00	$82.50
Antelope, D. T	24 00	1.8 50
Argyle Minn	15.48	100.00
Beardsly, Minn	11.95	77.50
Beach, M. T	27.50	137.50
Belle Prairie	8.80	60 00
Birdshill, Man	16.65	127.50
Brandon, Man	16.50	144.50
Colfax, D. T	12 75	82.00
Dairymple, D. T	14.00	92.50
Fort Keogh, M. T	32 25	152 50
Jamestown, D T	16.80	95.00
Little Falls, Minn	11.30	67.50
Miles City, M. T	32.15	151.00
St. Boniface, Man	16.50	126.25
Winnipeg, Man	16.50	126 00
Wheatland, D. T	14 50	85.0 0
Waverly, Minn	8.85	60 00

The passenger rates given are all from Milwaukee, and $1.70 should be added to each rate when figuring from Chicago. The freight rates are the same from each of the starting-points named.

Omaha and Kansas City Live Stock Receipts.

The receipts of cattle at Omaha and Kansas City in 1876 and 1881 are reported as follows by a correspondent who enlarges on the growth of the Omaha traffic:

	1881.	1876.	Increase.	P. c.
Kansas City	285,863	183,378	102,485	56 0
Omaha	166,100	48,220	117,880	244.5

The fact is that Omaha live stock business had hardly begun in 1876, when the Kansas City business was already very well developed.

Coal Movement.

Coal tonnages are reported as follows for the week ending March 4:

	1882.	1881.	Increase.	P. c
Anthracite	541,096	420,516	120,580	28.6
Semi-bituminous	116,343	76,975	39,368	51.1
Bituminous, Penna	65,634	49,905	15,729	31.4
Coke, Penna	76,540	50,078	26,462	52.9

Anthracite trade continues dull, and the production is for the present in excess of the demand. Reports continue of a movement among the miners which threatens to result in a general strike.

The companies in the Cumberland Region have resolved to reduce wages 50 cents a ton March 15, and a strike there is altogether probable.

The coal tonnage of the Pennsylvania Railroad for the week ending March 4 was: Coal, 156,783; Coke, 76,540; total, 233,323 tons.

The total production of coal from the mines on the line of the Union Pacific road owned by the company, in 1881, was as follows:

	Tons mined.	Tons sold.	Cost per ton mined.
Carbon mines	156,820	1,432	$1.44½
Rock Springs mines	279,908	115,490	1.22⅝
Almy mines	110,157	43,612	1.19
Grass Creek mines	40,608	19,474	2.19⅝
Total	587,493	180,008	$1.20

There was also sold 13,024 tons from the Pleasant Valley (Utah) mines, making 193,032 tons in all. The tonnage not sold was chiefly consumed by the company. The average receipt per ton sold was $5.69. The average haul on the coal sold was 352 miles, an extremely long haul for coal. Deducting the average cost of mining, the average receipt on the coal sold was 1¼ cents per ton per mile moved.

The annual report of Mr. Thomas Wilson, Jr., State Mine Inspector of Indiana, makes the following statement of the coal product, capital invested and number of mines in the state last year:

Counties.	No. of mines.	No. of men.	Coal in tons.	Capital in dollars.
Clay	35	2,256	921,228	$558,408
Daviess	8	569	201,533	121,500
Dubois	1	25	6,910	6,000
Fountain	5	402	177,880	113,000
Knox	2	136	53,474	8,000
Owen	1	64	23,121	31,000
Parke	11	350	143,146	163,500
Pike	1	70	22,830	25,000
Perry	1	25	13,850	176,600
Sullivan	4	116	36,033	100,000
Spencer	1	10	4,400	3,000
Vermillion	2	52	13,537	8,000
Vigo	4	178	51,500	29,300
Vanderburgh	3	143	67,147	71,502
Warrick	7	171	34,947	24,400
Total	86	4,567	1,771,536	$1,442,210

Referring to new coal fields, Mr. Wilson says the fields of Pike and adjoining counties will add considerably to the output during 1882. Pike and two or three adjoining counties are underlined with two immense beds of coal, extending under the whole section of that country. The coal of this new district is not of the best quality, but will compare very favorably with other coals of the state. This region is crossed by the Louisville, Evansville & St. Louis road.

Chicago coal receipts for January and February were: Anthracite, 86,778; bituminous, 451,199; total, 537,977 tons. All the receipts were by rail. Shipments for the two months were 110,810 tons.

The coal tonnage of the Chesapeake & Ohio Railroad in January was:

	1882.	1881.	Increase.	P. c.
Coal	57,721	48,888	8,833	18.0
Coke	9,266	4,573	4,693	102.0
Total	66,987	53,461	13,526	25.3

The coal this year included 1,459 tons cannel, 13,862 tons gas coal, 16,398 tons splint and block, and 26,002 tons New River and other steam coal.

Ticket Commissions.

The following circular has been issued by General Passenger Agent E. A. Ford for the Pennsylvania Company, the Pittsburgh, Cincinnati & St. Louis and the Vandalia Line:

"Having been requested by nearly all of our connecting lines in the West, Northwest and Southwest to discontinue the payment of commissions to their agents, the undersigned, representing the companies named above, and also representing (on east-bound commissions) the Pennsylvania Railroad Company, begs leave to notify all concerned that the request thus made will be complied with, and, until further notice, no commissions will be paid by or for these companies on tickets sold on or after March 1, 1882, to Pittsburgh or any point east thereof."

East-Bound Live Stock Rates.

Taking effect March 13, the following are the rates on live stock and dressed beef from Chicago to the points named below by all the lines leading east from that city in cents per 100 lbs.:

	Cattle.	Hogs.	Horses, mules and sheep.	Dressed beef.
Erie	18	15	25	27½
Dunkirk	19	16	27½	20
Buffalo, S. Bridge, Pittsburgh, Wheeling and Bellaire	20	17½	32½	22½
Albany	32	28	52	35
Baltimore	32	27	57	37
Philadelphia	33	28	58	38
New York	35	30	60	40
Boston	35	30	60	40

All live stock will be subject to the following minimum weights: Cattle, 19,000 lbs.; horses, 20,000 lbs.; hogs, double-deck cars, 22,000 lbs.; hogs, single-deck cars, 16,000 lbs.; sheep, single-deck cars, 14,000 lbs.

Railroads versus Steamship Agents.

The recent advance in emigrant rates is quite likely to prove disastrous to many of the agents selling steamship orders at this point. These agents intended to take advantage of the advance in rates and turn it to a source of profit. But the Eastern trunk lines, becoming aware of the game to be played, took steps that will place these parties *hors du combat* and inflict a heavy loss upon them. There is a practice that, if a party living here wants to bring over from Europe a friend or friends, he can buy a steamship ticket from Europe to New York of any authorized steamship agent in this city. These agents are also authorized to sell to such party an order for a ticket from New York to the West. This order is exchangeable for a ticket at the regular ticket offices of the trunk lines in New York. When the order for a restoration of the emigrant rates was received here many of the steamship agents stacked up a lot of prepaid orders, and in accordance with instructions reported them as having been sold to bona fide parties at the old rates before the order to advance the rates was received. But very few of the orders thus reported had been actually sold, the agents expecting to use them hereafter and pocket the difference between the old and the new rates, which is from $5 to $7 on each ticket. The large number of steamship orders thus reported to have been sold by the steamship agents at the old rates made the trunk lines suspicious, and to prevent their being defrauded by the steamship agents they adopted a rule that no steamship order shall be exchanged for a ticket unless presented by the party in whose name said order has been made out, and that such party will have to fully prove his identity before the ticket is issued to him. By this action on the part of the trunk lines orders made out for fictitious parties cannot be exchanged for tickets, and the steamship agents will be compelled to pay for all fictitious orders issued by them at the full rates, and instead of making money, as they expected, they will suffer heavy loss.—*Chicago Tribune.*

New York Canal and Railroad Traffic.

The Canal Auditor reports that the tolls collected on the New York Canals in 1881 were $523,029, or 45 per cent. less than in 1880, while the tonnage was 1,278,464 tons, or nearly 20 per cent. less.

The tons carried on the canals and on each of the great trunk railroads of the state for six successive years have been (the railroad years ending with September):

Year.	Canals.	N. Y. Cen.	Erie.
1876	4,172,129	6,803,680	5,972,818
1877	4,955,963	6,351,356	6,182,451
1878	5,171,320	7,695,413	6,150,568
1879	5,302,372	9,015,753	8,212 641
1880	6,457,656	10,533,038	8,715,892
1881	5,179,192	11,591,379	11,086,823

The changes from 1876 (another year of railroad war) to 1881 were:

	1881.	1876.	Increase.	P. c.
Canals	5,179,192	4,172,129	1,007,063	24·1
New York Central	11,591,379	6,803,680	4,787,699	70·4
Erie	11,086,823	5,972,818	5,114,005	85·6
Total	27,857,394	16,948,627	10,908,767	64.4

While the increase in canal shipments in these five years is large, it is trifling in comparison with the increase on the railroads, and the *increase* on the Erie road alone is nearly equal to the total canal shipments last year. In 1876 the canal tonnage was 24.6 per cent. of the whole; in 1881 it was 18.6 per cent. of the whole. Comparatively a small part of the canal traffic can be called local, and nearly the whole growth of the local traffic goes to the railroads, and probably a comparison of tonnage mileage would not be so much in favor of the railroads. In 1880, for instance, fully 2,000,000 tons of the canal freight was grain, nearly all carried the whole length of the canal. Lumber, coal and iron ore are the other chief items of canal freight, and these are mostly carried long distances—most of the lumber the whole length of the Erie Canal, and nearly all the ore the whole length of the Chmaplain Canal.

RAILROAD LAW.

Foreclosure of Mortgage—Right of Redemption.

In the Chicago, Danville & Vincennes Co., appellant, against Fosdick, trustee, and others, appeal from a decree of foreclosure and sale of road made by the Circuit Court for the Northern District of Illinois, the United States Supreme Court holds that the decree and sale must be set aside. The appellant company assigns, as errors in the decree of foreclosure and sale, first, that the Court below required from the mortgagor payment of the principal of the debt secured by the mortgage, as if it were then due, and, on non-payment thereof within twenty days, that the mortgaged property should be sold; second, that it decreed foreclosure and sale on this condition without proof of the written request of the holders of the majority of the bonds. This Court holds that the first assignment of error is well founded, inasmuch as the decree below denied to the mortgagor the right to redeem its property, and thus prevent the sale by paying, not the unmatured principal of the debt, but simply the interest then due and in arrears. The denial of this right was, in the opinion of this Court, a substantial and serious wrong. The second assignment of error is, this Court thinks, equally well founded. Even had the trustees rightfully declared the principal sum of the mortgage debt due and given proper notice thereof, nevertheless the foundation for proceeding to foreclose for that cause and for the decree requiring payment of that amount would fail without proof that the bill had been filed for that purpose upon the written request of the holders of a majority of the bonds then outstanding. It is not disputed that no such proof is to be found in the record. For these reasons the decrees are reversed and the causes remanded with instructions to proceed in conformity with this opinion. Justice Matthews delivered the opinion. Chief Justice Waite and Justice Harlan dissent, expressing the opinion—first, that the default having occurred and continued more than six months, the principal of all the bonds secured by the mortgage became immediately due and payable; second, that the trustees of the mortgage were not precluded from instituting proceedings for the foreclosure of the mortgage in case the safety of the trust made it necessary, no matter whether they had been requested in writing to do so by a majority of the bondholders or not.

The Tanner Brake Cases.

A Washington dispatch of March 13 says: "A decision was rendered by the Supreme Court of the United States to-day in the case of Charles T. Root, executor of Thomas Sayles, appellant, against the Lake Shore & Michigan Southern Railway Company, on appeal from the Circuit Court of the United States for the Northern District of Illinois. This was a suit in equity brought by Sayles against the railway company for alleged infringement of a patent upon an improvement in car-brakes. The patent upon which the complainant founds his claim for damages was originally granted to Henry Tanner, the inventor of the improvement, on July 6, 1852. On July 5, 1866, it was renewed and further extended for a period of seven years. Of this patent the complainant is the assignee, and he brings suit against the company for the unauthorized use by it of the car-brake in question from Aug. 6, 1869, to the expiration of the patent in 1873. He prays for an account of profits and for corresponding damages. The points of the defense set up by the railroad company are: First, that after the expiration of a patent a court of equity has no jurisdiction to entertain a bill merely for an account and the recovery of the profits which have accrued to the infringer during the existence of such patent, the remedy in that case being at law for damages; and second, that even if in certain cases such a jurisdiction exists the present case does not fall within it. The complainant, on the other hand, maintains that in cases involving the enforcement of the rights of patentees, resort may be had as a matter of right to a court of equity for the mere purpose of establishing an infringement and ascertaining and recovering the profits of the infringer upon the independent equitable ground that the latter is for that purpose a trustee of his gains for the use of the true owner of the patent and is liable to an account as such. Justice Matthews, in delivering the opinion of this Court, reviews very carefully and at great length the course of legislation and of judicial decision with regard to these questions, and comes to the following conclusions: First, that a bill in equity for a naked account of profit and damages against an infringer of a patent cannot be sustained; that such relief ordinarily is incidental to some other equity, the right to enforce which secures to the patentee his standing in court; that the most general ground for equitable interposition is to insure to the patentee the enjoyment of his specific right by injunction against a continuance of the infringement; but that grounds of equitable relief may arise other than by way of injunction, as where the title of the complainant is equitable merely, or equitable interposition is necessary on account of impediments which prevent a resort to remedies purely legal, and such an equity may arise out and inhere in the nature of the account itself of, springing from special and peculiar circumstances which disable the patentee from a recovery at law altogether, or render his remedy in a legal tribunal difficult, inadequate and incomplete, and as such cases cannot be defined more exactly, each must rest upon its own particular circumstances, as furnishing a clear and satisfactory ground of exception from the general rule. Second, that it does not appear from the allegations of the bill in the present case that there are any circumstances which would render an action at law for the recovery of damages an inadequate remedy for the wrongs complained of, and as no ground for equitable relief is presented, it is the opinion of this court that the Circuit Court did not err in dismissing the bill. Its decree is therefore affirmed."

THE SCRAP HEAP.

Locomotive Building.

The New York, New Haven & Hartford shops in New Haven, Conn., have lately completed a new freight engine for the road, and are building another freight and a passenger engine.

The Portland Company at Portland, Me., has just completed two engines for the New Brunswick Railway, and has begun on a contract for 34 engines for the Northern Pacific.

The New York, Lake Erie & Western shops at Susquehanna, Pa., are to build 12 new locomotives for the road.

It is said that the negotiations for the establishment of locomotive works in Youngstown, O., are nearly completed.

The Rhode Island Locomotive Works in Providence have recently shipped several heavy freight engines to the Wabash, St. Louis & Pacific road.

The Baldwin Locomotive Works in Philadelphia recently delivered two narrow-gauge consolidation engines to the Cairo & St. Louis, and two freight engines, with 17 by 24-in. cylinders to the Venice & Carondelet road. An order for 10 engines for the Western North Carolina road is nearly completed.

The improvements and additions to the Brooks Locomotive Works at Dunkirk, N. Y., are now substantially finished. They have much increased the capacity of the works. Orders are on hand which will take nearly a year to fill.

Car Notes.

The New York, New Haven & Hartford shops in New Haven, Conn., have nearly completed two sleeping cars, and have begun work on 25 passenger cars, which are much needed for the road.

The Portland Co., at Portland, Me., is building 25 dump coal cars for the Maine Central road, and 20 for the Portland & Ogdensburg.

New car shops are to be built at Kingston, Ont., a tract of five acres of land having been secured for that purpose.

The Canton Car Co., at Canton, O., is ready for business, and expects to turn out 10 box cars a day.

Jones & Co., of the Crescent Metal Co. in St. Louis, are making large quantities of car brasses for shops in Michigan and elsewhere.

Bridge Notes.

The King Iron Bridge Co., at Cleveland, O., has the contract for an iron bridge over the Brazos River at San Felipe, Tex., on the Texas Western road.

Gibson & Bland are about to put up bridge-building shops at Coatesville, Pa., which will employ about 125 men.

Cofrode & Saylor have purchased land adjoining their Philadelphia Bridge Works at Pottstown, Pa., and intend to put up a rolling mill for rolling bridge iron.

The Smith Bridge Co., of Toledo, O., is rebuilding and repairing a number of bridges on the Cleveland, Akron & Columbus road.

The Corrugated Metal Co., at East Berlin, Conn., has the contract for an iron bridge of 200 ft. span at Bardwell's Ferry, Mass., over the Deerfield River.

Iron and Manufacturing Notes.

The Rome Iron Mill at Rome, N. Y., is putting in a new 12-in. train of rolls.

The blast furnace at Swedeland, Pa., belonging to the Philadelphia & Reading Coal and Iron Co., is being repaired and will soon be started up.

The firm of Wilson, Walker & Co. (of the Union Forge and Iron Mills) composed of John T. Wilson, James R. Wilson and John Walker, general partners, and Andrew Carnegie, special partner, was dissolved on Jan. 31, Mr. Carnegie retiring. The business will be continued by the remaining partners, under the style of Wilson, Walker & Co., Limited.—*Pittsburgh American Manufacturer.*

The Pittsburgh Steel Casting Co. has begun to build a very large addition to its works.

Isabella Furnace No. 1 in Pittsburgh made 6,037½ tons of iron in the five weeks ending Feb. 25. The furnace is 20 ft. bosh and 75 ft. high.

The Colorado Coal & Iron Co. has contracts to furnish rails to the Denver & Rio Grande and the Denver Extension of the Chicago, Burlington & Quincy.

The Baily steel plate and nail works are to be moved from Harrisburg, Pa., to Thorndale in Chester County.

The rolling mill at Dover, Morris County, N. J., is being enlarged.

The Brazil steel and Iron Co. has been formed at Brazil, Ind., for the purpose of making heavy forgings and heavy bar and guide irons. Orders have been given for the necessary machinery.

The rolling mill of the Duncannon Iron Co. at Duncannon, Pa., was burned down March 13. The loss is estimated at from $50,000 to $75,000, depending on the amount of damage done to the machinery.

The Pittsburgh Steel & Iron Co. has been organized to take and work the establishment of the Siemens-Anderson Steel Co. in Pittsburgh. Negotiations are now pending for the settlement of the debts of the old concern.

Prices of Rails.

Steel rails are quoted at $55 to $58 per ton at mill, with few sales reported.

Iron rails are very quiet and unchanged at $48 to $52 per ton at mill, according to section.

Spikes are steady at $3.10 to $3.15 per 100 lbs.; fish-plates, $2.65 to $2.80; track-bolts, $3.75 to $4.25.

No sales of steel blooms are reported; they are offered at $45 per ton at tidewater, duty paid.

Old iron rails are quoted at $29 per ton for tees and $31 for double-headers in Philadelphia, with only small sales.

Ventilating Window for Railroad Cars.

This invention, which has been patented by Mr. John M. Forbes, of Milton, Mass., is intended to ventilate cars "without the introduction of dust and cinders, without obstructing the view from the window, without letting in the cold air during the severe season, and without preventing the window from being raised up out of the way altogether, if desired."

The mechanism by which this is effected consists of an outer and inner sash *B* and *C*, the inner sash *C* resting, when closed down, on a ledge or sill *H*, and inclosing an

Fig. 1.

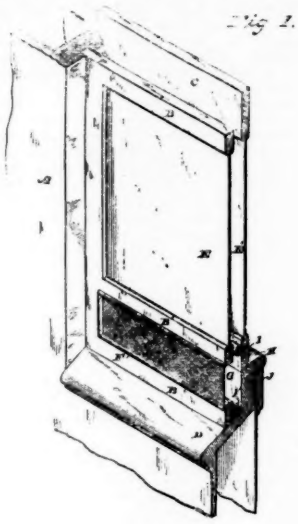
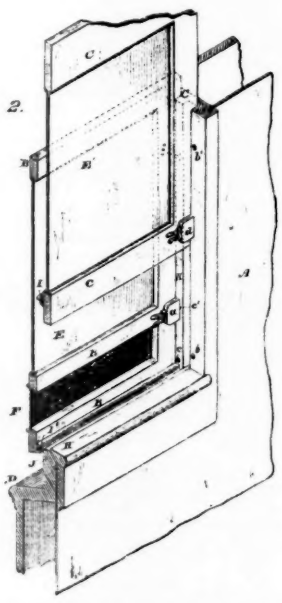


Fig. 2.



ordinary pane of glass *E'*, the outer sash *B* resting, when closed down, upon a ledge or sill *D*, six or eight inches below the ledge or sill *H*, upon which the inner sash *C* rests, said outer sash *B* inclosing an ordinary pane of glass *E*, extending from the upper bar of sash *B* to the partition-bar *B'*, which, when both sashes *B* and *C* are closed down, is directly opposite the top line of the lower bar of inner sash *C*, and also inclosing a wire or other gauze pane or panel *F*, extending from the bar *B'* to the lower bar of sash *B*; so that when both sashes *B* and *C* are closed down the wire or other gauze pane or panel *F* is not visible to the passenger within, does not obstruct his view, and inner sash *C*, being guarded with a tight weather-strip attached to it at *I*, made of rubber or other substance, keeps out the cold in the severe season; but when the inner sash is raised a free ventilation and draft ensues through the wire or other gauze pane or panel *F* of the outer sash *B*, blowing up through the space *G*, between *F* and the inner ledge or sill *H*; and it will be seen by a further reference to fig. 1 that a weather-strip is attached to the lower bar of *B* at *I'*, so that while the gauze *F* admits air and ventilation the dust and cinders are excluded; second, by a novel construction upon the above described device, and forming a part thereof, of a lock or catch *a* in outer sash *B*, and stops or sockets *c*, *c'* and *c''* in window-facing *K*, opposite to and working with lock or catch *a*, so that when the inner sash *C* is raised the outer sash *B* may be raised also, until its bottom point, guarded by weather-strip *I'*, is opposite to and rests on ledge or sill *H* at point *J*, in which position lock *a* and socket *c'* hold it, thus bringing *F* opposite the face of the passenger, so that the breeze will blow directly upon him, while the dust or cinders cannot penetrate through *F* or *I'*.

Types of Brakemen.

"How many types of the many-sided brakemen we have traveled with," said the jester, musing over five years platform travel. "There is the plural one, you know, who always doubles up on the names of the stations and calls out Clevelands! Clevelands! Change cars for Hudsons, Ravennas and Akrons! This car's for Buffaloes!"

"And the jovial one," said the fat passenger, "the jolly brakeman, who is always happy; who, when we run into a penitentiary town, always shouts, 'Moyamensing! Change suits! Seven years for refreshments!' If you tell him the fire has gone out he wants to know who left the door open. The crosser the passengers are the merrier he is, and it would be a thing without parallel to see him mad."

"And the dismal brakeman," said the cross passenger, "who puts wet wood in the stove and leaves the door open, and spills grease on you when he lights the candles, and if you ask him when we get there, he sighs and says we may never get there. He points out of a window at a whistling post and says, 'There's where number six ran off and killed Billy Bly last week.' And when we cross a ravine he says, 'This is the same kind of a bridge the Ashtabula disaster happened on.' And he points to a heart-broken man two seats ahead of you and tells you, 'His wife is dead. We've got her in the baggage car.' And then in a determined effort to increase your gloom, if possible, he adds, 'Only one he had.'"

"And the cautious brakemen," said the sad passenger, "the slow-spoken man who always looks at his watch very carefully before he will tell you at what time the train is due at the terminus, and looks out the window to get his landmark before he tells you where you stop for dinner."

"And the irascible duffer," said the man on the wood-box, "who roars 'Naw!' when you ask him if this is a mail train and bangs the door against your elbow every time he comes in and tells a bewildered woman who wants to know how she can get to Neblet's Siding that night, 'that she can get off at the tank when we stop at Brewster's, run down on 12 and catch 22 coming back on 15's time, and that's the only train that stops there.' And he gets so filled with wrath that he has to get out on the platform and swear it off at the little snow birds on the telegraph wires. I know him," the man on the wood-box said, as he rubbed his elbow with pathetic emphasis.

"And the liar," said the woman who talks bass, "who tells you the train makes close connections with other trains at places that are not junctions, who tells he'll build a fire in that car after they leave the next station, and you find that the station is the end of his run; who says he'll help you out with your bundles and then runs back into the parlor car to talk with the engineer's daughter, and who always tells you he has no key when you ask him to turn a seat for you."—*Burlington Hawkeye.*

Attempts at Train Wrecking.

A dispatch from Ft. Worth, Tex., March 14, says: "A regularly organized band of train wreckers is operating in this state. Last evening a rail was removed from the Gulf, Colorado & Santa Fe track, 50 miles south of this place on a high bank. The north-bound express train made a miraculous escape. Going at the rate of 25 miles per hour, it passed over the ties, striking the track all right in front of the removed rail.

"The would-be wreckers attempted to wreck a train on theTexas Central road near Palmer last Thursday. Efforts are making to detect them."

Candles Instead of Lamps.

The London *Engineer* in commenting on the verdict of the coroner's jury on the Spuyten Duyvil accident, says: "The coroner's jury on the Spuyten Duyvil accident recommended that candles should be used instead of oil lamps. Another jury will perhaps recommend that the tinder box, steel and flint shall be used instead of matches, because matches have been known to cause a fire. Oil lamps may be far from the best means of lighting carriages, but there is no reason for going backwards from oil instead of employing the oil-gas lights which are superseding oil."

It is to be regretted that the jury did not condemn the use of shavings for deadening the floors of cars, which is attended with great danger in accidents of this kind. Their use should not be permitted and railroad managers who continue to use them are assuming a grave responsibility. Not only ought they not be put into new cars, but they should be removed, as soon as possible, from all old ones.

Ventilating the St. Louis Tunnel.

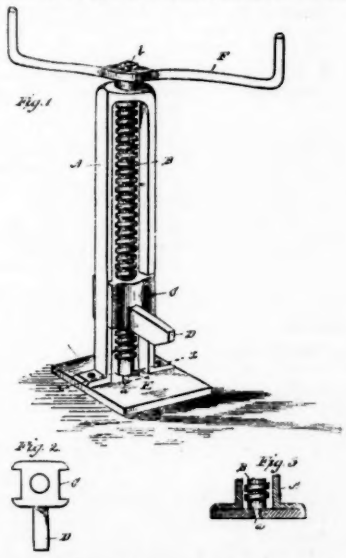
A dispatch from St. Louis, March 13, says: "The great fan, which has been constructing for some time, for clearing the railroad tunnel between the bridge and Union Depot of smoke from the passing trains, is now in operation and works very satisfactorily. The entire tunnel can be cleared of smoke from the heaviest freight train in three minutes, and when no trains are in it the air is as fresh and clear as that outside

Railroad-Track Jack.

The engraving represents a form of jack-screw for railroad use recently patented by Louis J. Crecelius, of St. Louis, Mo. It is very well designed and has the appearance of being well suited for the work for which it is intended.

The principal claims in the patent specifications are the following:

"A railroad-track jack consisting of an inverted U-shaped frame, a base or bed-plate, a screw journaled in said frame



or base at the top and bottom, a traveling nut carrying a lifting lug or lever, and suitable bar or wheel, substantially as set forth.

"In a railroad-track jack, a traveling nut carrying a lifting-lever having ways in which it rides on both sides of the frame, and internally screw-threaded to adapt it to be raised and lowered by a rotating screw, substantially as described."

Value of a Railroad Train.

When one of the fast express trains comes puffing into the Asylum Street Station, bystanders admire its massive locomotive, its handsome cars, and especially the elegant appearance of its parlor coaches. Yet few have any conception of the money value represented in such a train, and the responsibility placed by the company in the hands of the men entrusted with its movement from place to place. A railroad official the other day gave some interesting figures as to the value of the midday express from New York, which was a fair representative of the fast express trains on the New York, New Haven & Hartford road. There was an engine, tender and eight cars. The engine and tender, which are always considered together, were valued at $10,500; the baggage car, $1,000; the postal car, $2,000; the smoking car, $5,000; the two ordinary passenger cars, $10,000 each; and the three palace cars, $15,000 each; total, $83,500. This is a low, rather than an excessive estimate, for one of the fast expresses, as some of them, with more cars, are worth $100,000 at least. The palace cars, put down at $15,000, are, in many cases, worth an average of $18,000. These cars came into use soon after the sleeping coaches, the first being used in 1863. In some instances these cars have cost as high as $25,000 and $30,000, where the interior workmanship was very elaborate. From the figures given it will be seen that a comfortable dwelling can be built for the cost of an ordinary passenger car, and that the money expended for a palace coach would erect a very handsome brick or brown stone front residence.

It is an interesting reflection that the safety of one of these costly trains, to say nothing of the passengers, devolves almost wholly upon one man—the engineer. There are other trainmen, the conductor, baggage-master, fireman and three or four brakemen, but the hand upon the lever and the brain directing it have an immense responsibility.—*Hartford (Conn.) Courant.*

OLD AND NEW ROADS.

Arkansas State Railroad Bonds.—A dispatch from Little Rock, Ark., March 15, says: "John McClure has filed a bill in the United States Circuit Court for the Eastern District of Arkansas, against the Little Rock & Fort Smith Railway Company to compel the payment by that corporation of all overdue coupons of the bonds issued by the state to aid in the construction of the road, and known as the Arkansas railroad aid bonds. The complaint is filed in the name of William H. Tomkins, of New York, and asks for the appointment of a receiver to take possession of the road until payment is made. It also asks that a decree be made compelling the company to return to the state treasury all the state aid bonds now held and owned by the company, and which were purchased for that purpose. This is a test case, and if successful is to be followed by suits against other roads to which bonds were issued at the same time, viz.: the Little Rock, Pine Bluff & New Orleans; Mississippi, Ouachita & Red River; Arkansas Central, and Memphis & Little Rock. All of these roads, with the exception of the Central, are in good condition and worth many times the amount of the bonds issued. The companies have bought up and hold a large amount of the bonds with the view of returning them to the state if held liable."

Atchison, Topeka & Santa Fe.—Negotiations have been going on for some time with the Sonora Company whose line is to form an extension of this road to Guaymas, Mexico, and which is owned by stockholders largely interested in this company also. The result of these negotiations is expressed in the following circular just issued to stockholders of the Sonora Company:

"The Atchison, Topeka & Santa Fe Railroad Company offers to purchase the stock and income bonds of this company, and to give in exchange therefor one share of Atchison stock for two shares of Sonora stock or $200 (par) of income bonds; also to guarantee the payment of interest upon this company's first-mortgage bonds. This offer is not binding unless accepted by representatives of a majority of the Sonora stock and incomes (issued and to be issued) on or before March 22, 1882. If a majority is secured the guarantee will be executed upon outstanding bonds, and the exchange made for outstanding stock and incomes on subscriptions 1 and 2 as quickly as practicable thereafter. The guarantee will be executed upon the bonds and the exchange made for the stock and incomes under subscriptions 3 and 4, as the same are issued upon full payment of the subscriptions. Interest will be adjusted with the subscribers to Nos. 3 and 4 blocks at 5 per cent. The Sonora directors recommend you to accept this offer. If you approve their recommendation please fill out and sign the inclosed blank, and return the same to this office. It must be received here on or before the 22d inst."

Work is now well advanced on a branch six miles long from Las Vegas, N. M., to the Las Vegas hot springs. It is to be finished in April.

Boston & Bangor Steamship Co.—This is the new name of the corporation formerly known as the Sanford Steamship Company, which runs its steamboat lines from Boston to Bangor, Belfast, Rockland and other points on the coast of Maine.

Boston, Lowell & Concord.—In consequence of the recent decision of the New Hampshire Supreme Court, the directors of the Boston & Lowell and the Concord companies have agreed upon a new contract for the joint operation of their lines. This contract will be submitted to the Court for its approval.

Buffalo, Pittsburgh & Western.—On the extension of this road track is now laid from Warren, Pa., to Kinzua Bridge, 10 miles. The bridge at that point is nearly completed, and tracklaying was to be resumed this week. The grading is finished from Kinzua Bridge to State Line, and work is now in progress between Wolf Run and Salamanca.

Carson & Colorado.—This road is now completed to Candelaria, Nev., 152 miles from the junction with the Virginia & Truckee at Mound House, and 15 miles beyond the late terminus at Soda Springs. Through trains have begun to run to the new terminus. Candelaria is to be the terminus for some time, though a branch to Bodie and Mono, Cal., is proposed.

Central, of New Jersey.—Argument before the United States Circuit Court, in the suit to enjoin the company from issuing any new stock, was to have been heard March 13, but was postponed until March 27, by consent of both parties.

Chattahoochie & East Pass.—This company has been fully organized and surveys are being made for the road. It is to run from Chattahoochie, Fla., to a point at or near the entrance to Apalachicola Bay, known as the East Pass. It will be an extension of the Savannah, Florida & Western's line from Bainbridge to Chattahoochie, now under construction.

Chicago, Burlington & Quincy.—From March 8 all freight business going over this road to Omaha crosses the Missouri at Plattsmouth and will be taken to Omaha direct over the Burlington & Missouri River line. Heretofore Omaha freight has gone to Council Bluffs and has been transferred there.

Chicago & Eastern Illinois.—The United States Supreme Court has reversed the decree of foreclosure under which the Chicago, Danville & Vincennes road was sold and bought by certain bondholders, who organized this company. The decision is based upon the action of the Circuit

Court in requiring from the old company payment of the principal of the mortgage, when payment of arrears of interest should have been sufficient to redeem the road, and that the trustee began proceedings to foreclose without sufficient authority from the bondholders. This decision does not by any means put the Chicago, Danville & Vincennes Company in possession; it simply remands the case to the Circuit Court for further proceedings in accordance with the new decision. The present company has added largely to the property, both in extensions and improvements, and, of course, owns all the additions; the old company, as before the foreclosure, owns simply the equity of the road as it then stood, subject to the lien of the bondholders. The old suit is still pending under the decree, and further proceedings must be had, though it still seems uncertain what they will be. It is possible that a new decree of foreclosure and sale may be granted, or that a new suit may be begun to foreclose. It is also possible that some arrangement to buy out the old company's claim may be made. Some action will probably be taken soon.

Chicago & Kansas City Air Line.—This company has filed articles of incorporation in Illinois. The route of the proposed road is from Chicago to Kansas City, passing through the counties of Cook, Dupage, Will, Kendall, La Salle, Putnam, Storke, Knox, Warren, Henderson and Hancock, in Illinois, to the Mississippi River, and thence by the most desirable route to Kansas City. The principal office is to be established at Chicago, and the capital stock will be $5,000,000.

Chicago, Milwaukee & St. Paul.—It is said that grading will soon be begun on the branch which is to run from Defiance, Ia., on the Council Bluffs line, to Sioux City. It is also said that the Dakota Southern line will be extended from Yankton to a connection with the James River Branch, now partly completed, and that the company's intention is to build this line northward to Jamestown, on the Northern Pacific. This would make a line from the Council Bluffs Extension and Sioux City in a generally northern direction to the Northern Pacific, through the best part of Dakota.

Chicago & Northwestern.—It is stated that a branch will be built from Maple River line at Sac City, Ia., westward to Correctionville, about 47 miles, this season. It is said also that this line will probably be extended from Correctionville west about 40 miles to Sioux City.

Chicago, St. Paul, Minneapolis & Omaha.—The directors have voted to accept the recent act of the Wisconsin Legislature, under which this company will secure the land grant claimed for the Chicago, Portage & Superior road.

Cleveland, Columbus, Cincinnati & Indianapolis.—Notice is given that 45 consolidated mortgage bonds have been drawn for redemption in accordance with the terms of the mortgage, and will be paid June 1 next, by Drexel, Morgan & Co. in New York, or J. S. Morgan & Co. in London. The numbers drawn are: 3842, 3856, 3918, 3947, 4005, 4111, 4254, 4344, 4357, 4370, 4474, 4488, 4534, 4591, 4698, 4775, 4828, 4920, 4932, 4956, 5023, 5042, 5161, 5180, 5207, 5500, 5705, 5755, 5844, 5856, 5876, 5908, 5959, 5976, 6017, 6066, 6075, 6098, 6258, 6260, 6384, 6401, 6405, 6446 and 6764. Interest on these bonds will cease from June 1 next.

Denver & New Orleans.—The grading of this road is now nearly completed from Denver, Col., to Pueblo, 120 miles, and the track is laid for 79 miles southward from Denver. A number of cars have been received, and it is expected that trains will be put on the road next month. The line passes east of Colorado Springs, and a branch to that place is to be built.

East Tennessee, Virginia & Georgia.—This company makes the following statement for the six months ending Dec. 31, last:

Passengers	$447,657
Freight	1,242,579
Other sources	85,302
Total earnings	$1,775,588
Expenses	1,019,659
Net earnings	$715,929

No comparisons can be made, as the company's report for the year ending June 30 last has not yet been issued.

Florida Central & Western.—This company has been organized by the English parties who lately bought the Florida Central and the Jacksonville, Pensacola & Mobile roads. This new company is to own and operate both roads, under one organization. The English party, represented by Sir Edward J. Reed, has a controlling interest, and a large share is also held by Philadelphia capitalists, the Dutch purchasers having sold out entirely.

Galesville & Mississippi.—This company has been organized to build a railroad from Galesville, Wis., west by south to Trempealeau, about 10 miles. It will be a branch of the Chicago & Northwestern.

Galveston, Harrisburg & San Antonio.—Track on the extension of this road is now laid to Eagle Pass Junction, 140 miles west by north from San Antonio, Tex., and 47 miles beyond the late terminus at Uvalde. Rails in large quantities have recently arrived at Galveston for the road.

On the El Paso Division (which is built and operated by the Southern Pacific) track is now laid for 40 miles southeast of the late terminus at Marfa, Tex., and 235 miles from El Paso. Work is progressing rapidly.

Grand Forks & Western.—This company has been organized to build a railroad from Grand Forks, Dak., westward to a junction with the Casselton Branch of the Northern Pacific. The distance is about 35 miles.

Gulf, Colorado & Santa Fe.—On the extension of the main line northwest grading is now finished from Belton, Tex., to Lampasas, and tracklaying has been begun at Belton. Contracts have been let for grading from Lampasas to Brownwood.

Houston & Texas Central.—Work has been begun on the grading of a branch of this company's Texas Central line which is to run from Garrett, Tex., northwest. Laydon & Terrell are the contractors.

Illinois Central.—This company makes the following statement of traffic on its lines for the month of February:

	1882.	1881.	Increase.	P.c.
In Illinois	$535,145	$443,679	$91,466	20 6
In Iowa (leased lines).	154,242	80,820	73,422	90.8
Total	$689,387	$524,499	$164,888	31.4

During February, 1882, the land sales were 1,306.41 acres for $7,346.69, and the cash collected on land contracts was $7,984.39.

Illinois Midland.—The Receiver of this road having failed to pay rental due for the use of the track of the Peoria & Pekin Union road, over which it enters Peoria, has been cut off by that company from the use of its terminal facilities in Peoria. The freight trainmen recently struck to secure several months' pay now due them, and all freight traffic over the road has been stopped.

Indianapolis & Evansville.—The Indiana Circuit Court at Evansville has granted an application made by the creditors for a receiver for this company's property. The company has partly graded a line from Evansville north about 40 miles, and has a few miles of track laid.

Kansas Central.—This road has been transferred to the Union Pacific Company and will hereafter be operated as a branch of the Kansas Division.

Kansas City, Lawrence & Southern Kansas.—Track is now all laid on the extension of this road from Olathe, Kan., northeast to Turner, on the Kansas City line of the Atchison, Topeka & Santa Fe. The new road is 17 miles long, and gives the road a line to Kansas City independent of the Kansas City, Fort Scott & Gulf, whose track it has always used. The road is controlled by the Atchison, Topeka & Santa Fe.

Knox & Lincoln.—The Maine Central Company has made a new proposition, offering to buy this road instead of leasing it. The price offered is $1,200,000, payable in Maine Central 5 per cent. bonds secured by a first mortgage on the purchased road. This is about $24,000 per mile.

Leavenworth, Topeka & Southwestern.—Track on this road is now laid to the west line of Leavenworth County, 20 miles from Leavenworth, Kan., and eight miles beyond the last reported terminus at Stranger Creek.

Manitoba Southwestern.—The Court at Winnipeg, Manitoba, has decided that the election of General Hammond and associates (the Northern Pacific interest) at the recent annual meeting was legal, and that the stock by which they were chosen is valid. The election held by the Schultz party (the local interest) is held as illegal and void, and the directors chosen thereat are enjoined from attempting to interfere in the management of the company's affairs.

Memphis & Little Rock.—A dispatch from Little Rock, March 7, reports that an important case has just been decided in the Supreme Court. In January, 1861, the State Legislature, under and act to encourage internal improvement, appropriated $100,000 and loaned it to the Memphis & Little Rock Railroad Company for ten years at 8 per cent. interest, the company giving a note and a mortgage on the road as collateral. The mortgage was never recorded, but was filed in the office of the Secretary of State, and other mortgages were afterward given, under one of which the road was closed. The Supreme Court now decrees that, unless the company pays the state $202,133, with interest at 8 per cent. from December, 1879, the rolling stock shall be sold by a special commissioner on March 30, 1882, subject to mortgage of May, 1860.

Mexican National.—On March 8 track on this road was laid to and across the Solado bridge, 45.3 miles westward from the Rio Grande at Laredo. The bridge is completed and side-tracks put in. A regular train has been put on to run between Laredo and Jarita, whence stages run to Villadama and Monterey.

Minneapolis & St. Louis.—A preliminary line has been run for the extension of this road from a point near Des Moines, Ia., to Creston, on the Chicago, Burlington & Quincy. The distance is about 50 miles.

Missouri Pacific.—Articles of consolidation have been filed of the Missouri Pacific Company in Nebraska with the Missouri Pacific Railroad Company. The Nebraska company is building the section in that state of this company's new line to Omaha on the west side of the Missouri River.

New York Central & Hudson River.—The Utica (N. Y.) *Herald* says: "After running night and day the conductors on the Central-Hudson road hereafter will have to sit down in their offices at the terminal points of their routes and foot up the money value of each ticket collected on their trains. This is undoubtedly done to save clerk hire in the general ticket department. * * * The Central-Hudson Company has had its spasmodic Spuyten Duyvil reform movement and now it falls back into the old ruts. Saturday all of the extra trainmen employed on freight trains as an additional means of security against accidents were discharged. The company is erecting wooden indicators at various points on the road to take place of extra flagmen. If a train breaks down hereafter these wooden boxes are probably expected to shoulder a red flag or light and a string of torpedoes and go back a half a mile so as to prevent the train following from colliding with the wreck. This is a block system for a cent!" Between 400 and 500 men are thrown out of employment."

New York & New England.—There is much local interest in the proposed extension of the Southbridge Branch, and an effort is being made to have the line run to Brookfield.

During the month of February 2,642 cars were transferred across the Hudson River between this road and the Erie, 1,718 going east and 924 west.

Ohio & Mississippi.—Receiver Douglas reports to the Court for February as follows:

Cash balance, Feb 1	$44,088.35
Receipts from all sources	363,573.64
Total	$407,661.99
Disbursements	323,813.90
Balance, March 1.	$83,848.09

The receipts exceeded the disbursements by $39,759.74 for the month.

Oil City & Chicago.—This company has been organized to build a railroad from Oil City, Pa., to a point on the New Castle & Oil City road, near Jackson Centre, in Mercer County, a distance of about 40 miles. It is controlled by the Buffalo, Pittsburgh & Western Company.

Oregon Railway & Navigation Co.—Work has been begun on the surveyed branches from Colfax, Wash. Ter., to Farmington, about 30 miles, and from Colfax west to Moscow, Idaho, 26 miles.

Surveys have been begun for a branch from Walla Walla, Wash. Ter., to Pendleton, and it is stated that work will be begun as soon as the location is finished.

Pennsylvania.—The eastern section of the new cut through Bergen Hill on the New York Division is now completed and trains have begun to run through it. There still remains a point to be cut away on the eastern end to complete a straight line from Jersey City through the hill, which will take some months longer. The new cut reduces the distance a little and does away with four sharp curves; it is wide enough for four tracks, two of which will be used for passenger trains and two exclusively for freight. The work has been in progress for two years, and has been an expensive one, most of the cutting being through hard trap rock.

It is stated that work is to be pushed on the third and fourth tracks on the New York Division, the object being to complete four tracks between Jersey City and Philadelphia as soon as possible.

At the annual meeting in Philadelphia, March 14, some excitement was caused by Messrs. Lockwood and Parker, two stockholders who have before been prominent at the meetings, and who asked a number of questions, principally relating to the Philadelphia, Wilmington & Baltimore purchase and the American Steamship Company. Their interruptions were apparently distasteful to most of the stockholders, and attempts to hiss them down. The usual resolution to adopt the report and refer its recommendation to the new board was passed. A resolution was adopted indorsing the system of differential rates established by the management of the company and urging that no departure be made from it. Mr. Parker offered one to the effect that the capital and revenue accounts of the company shall hereafter be kept separate, revenue income to be applied only to revenue purposes, and all capital requirements to be raised as such from other sources, and that in future ordinary shareholders shall receive in money or in kind all surplus profits after providing amply for the interests of all prior stock, shares and other legitimate revenue charges. This resolution was referred to the incoming board. The usual resolution to appoint a committee to nominate directors to be voted for at the annual election on March 28 was adopted.

The nominating committee appointed is as follows: Gustavus Remak, A. W. Williamson, John F. Smith, James M. Vance, Henry Pemberton, Henry Norris and Judge Wm. A. Porter.

Peoria & St. Louis Air Line.—This company has filed articles of incorporation in Illinois for a railroad to run from Peoria to East St. Louis, by the shortest practicable route.

Philadelphia & Reading.—Further proceedings are to be taken before the United States Circuit Court in the matter of the deferred income bonds.

The agreement between this company, the New York Central & Hudson River, the Jersey Shore, Pine Creek & Buffalo and the Fall Brook Coal Company provides that the Pine Creek road is to be built as soon as possible, and the Reading is also to construct its branch from Shamokin to Danville at once. The line which will thus be completed between Philadelphia and Buffalo by the Reading, the Pine Creek road, the Fall Brook Company's road and the New York Central will be known as the New Line, and a certain amount of traffic will be guaranteed by the contracting companies. The Reading agrees to send by this line all its coal business to Buffalo and points west, and to furnish all the coal that may be required to meet the demands of the business, provided that it shall not be required to ship westward more than one-third of the total output of its mines in any one month. There are minor provisions not made public, but these are said to be the chief points of the contract.

Pittsburgh, Bradford & Buffalo.—It is reported that this road has been sold to the Pittsburgh & Western Company. The road extends from Foxburg, Pa., to Clarion, with a branch partly finished to Kane and Bradford. The new owners will, it is said, at once extend the line three miles, from Foxburg to Parker, whence connection with the Pittsburgh & Western will be made over the Parker & Karns City and the Karns City & Butler roads to Butler.

Pittsburgh & East End.—This company has been organized to build a suburban line 7½ miles long from Grant street in Pittsburgh along the bluff to the Pittsburgh driving park.

St. Louis, Iron Mountain & Southern.—This road will carry free of charge all supplies intended for the sufferers from the floods in the lower Mississippi and its tributaries. It is probable that a large amount will be shipped.

St. Louis & San Francisco.—At the annual meeting in St. Louis, March 14, the stockholders voted to approve the execution of the consolidated mortgage for $30,000,000, and to authorize the completion of the consolidation of the leased lines with the company.

Shenango & Allegheny.—An extension of this road has been completed from the old terminus at Shenango, Pa., to Greenville. The new line is two miles long, and is parallel to the New York, Pennsylvania & Ohio track, which this road has hitherto used. It was to be opened for business this week.

Texas Western.—Work has been for some time in progress on the grading of this road, and tracklaying has been begun from Patilson, Tex., the present terminus, westward, and from Sealy, the Gulf, Colorado & Santa Fe crossing, eastward.

Tonawanda Valley & Cuba.—The contract for grading this road from Cuba, N. Y., to Arcade, about 18 miles, has been let to Antonelle & Gibson, who have begun work.

Union Pacific.—The Denver & Boulder Valley Company has begun suit against this company to enforce payment of $700,000 bonds. The complaint charges that the Denver & Boulder Valley transferred its road to the Denver Pacific (since consolidated with this company), the condition being that the lessee should pay interest on the bonds and provide for the principal when due. This, it is charged, has not been done.

This company now operates the Kansas Central road, a narrow-gauge line which is in operation from Leavenworth, Kan., west to Clay Centre, 150 miles.

Wabash, St. Louis & Pacific.—Regular trains began to run over the St. Louis, Jerseyville & Springfield branch on March 6, the opening having been delayed by high water and some damage done by wash-outs.

It is said that this company will soon begin work on a branch into Atchison, Kan., which will probably start from Plattsburg, Mo., on the St. Joseph branch.

Arguments were heard in the United States Circuit Court in Indianapolis last week in the suit brought by the holders of Toledo, Wabash & Western equipment bonds to enforce their claims against the present company.

General Superintendent Andrews has put an additional force of men on the St. Charles bridge replacing the scaffold for removal of the remaining span of the old iron pattern. This span will be taken down first and replaced by a strong wrought-iron and steel span. The material for this part of the work is nearly all on hand, and had it not been for the recent washing away of the false work, the work would have been completed. The span will probably be ready to cross trains on by the first week in April. Col. Andrews is rushing the work on the middle span in order that the channel may not be obstructed to the detriment of navigation any longer than possible. When this is completed the attention of the bridge builders will be turned to the replacing of the eastern span which fell last December. A steel and

wrought-iron span will be put in at that place, and the bridge, it is thought, will be as safe as any in the country. The débris of wrecked span and train on the St. Charles side of the river has never been taken out of the water. After the work of building is finished Col. Andrews will order a temporary incline laid on the St. Charles side down into the water. Blocks and tackle will be brought into requisition and the strength of a half-dozen locomotives will be brought to bear on the wreck of 1879, and it will be pulled out of the water as will the débris on the Brothertown side, in accordance with the requirements of the government.

Watertown & Boston.—A preliminary organization has been completed to build a short branch road from Charles River in Watertown, Mass., to the Boston & Albany near Faneuil station. It is intended for suburban traffic.

Waukegan & Western --This company has been incorporated to build a railroad from Waukegan, Ill., west to the Lake County line, a distance of 18 miles. Capital stock, $300,000; office in Chicago.

Western & Atlantic—In accordance with a resolution of the Legislature, Attorney General Anderson, of Georgia, has been for some time investigating the validity of the bond for $8,000,000 given by this company as security for its faithful performance of the conditions of the lease of the road from the state of Georgia, and also the present ownership of the shares in the company. He has recently made a report to the Governor holding that the bond given by the company is not valid, for the reason that the railroad companies which are sureties on the bond, have become so without sufficient authority, the action of their boards of directors in giving such surety and guarantee never having been formally approved by the stockholders of the several companies.

In accordance with this report the Governor has served notice on the lessees requiring them to file a new bond within 60 days. What action they will take is not known, but it is believed that they will not accept the Attorney General's opinion, but will contest the matter in the courts. Should a new bond not be filed the Governor will make a formal demand for the surrender of the road and the matter can be taken into court at once.

The second branch of the investigation, as to the ownership of the shares in the lease, has not yet been completed, and no report has been made thereon.

ANNUAL REPORTS.

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St. Louis & San Francisco.

This company operated at the close of the year 1881, which is covered by its last report, the following lines:

	Miles.
Pacific, Mo., to Seneca	292 625
Pierce City, Mo., to Wichita, Kan	218.500
Girard, Mo., to Galena, Kan., and Joplin branches	57.355
Short branches	4.790
Arkansas Division, Plymouth, Mo., to Brentwood, Ark	87.900
Atlantic & Pacific, Seneca to Vinita, I. T	33.875
Total worked	695.045

The average mileage for the year was 624 miles. An extension of the Arkansas line is in progress; also an extension from Pacific to St. Louis, 34 miles.

The equipment consists of 64 locomotives; 21 passenger, 2 sleeping, 8 combination and 16 baggage cars; 842 box, 285 stock, 20 flat, 903 ore and 43 caboose cars; 2 directors' cars, 1 pay-car and 9 service cars.

The general account, condensed, is as follows:

Common stock		$10.500,000.00
Preferred stock		10,000,00 .00
First-preferred stock		4,500 000 00
Total stock		$25 000,000.00
Funded debt		18 650,000.00
Other liabilities		1,054,600.16
Balance of income		910,534 03
Total		$45,615,134.22
Cost of road and property	$38,280,339.58	
Other assets, including cash, materials, bills and accounts receivable, stocks and bonds owned, leased lines and lands	7,334.794.64	
		45,6 5,134.22

The bonded debt consists of $7,144,500 South Pacific bonds; $500,000 "A" bonds; $5,166,500 "B" and "C" bonds; $639,000 equipment bonds; $1,100,000 Missouri & Western bonds; $1,350,000 trust bonds of 1880; $750,000 new general mortgage bonds and $2,000,000 St. Louis, Wichita & Western bonds.

The Land Department reports sales of 207,717 acres for $382,141.93. At the close of the year there were 708,461 acres unsold. The estimated value of land contracts on hand and unsold lands is $2,517,509 83. All the land debenture bonds have been retired except $4,000, which have been drawn for payment, but not yet presented.

The traffic for the year was as follows:

	1881.	1880.	Inc. or Dec.	P.c.
Train miles	1,180,763	1,669,470	I. 311,293	18.3
Pass. car miles	2,460,821	1,884,601	I. 576,220	3 .4
Freight car miles	18,264,163	17,054,481	I. 1,209,682	7.1
Passengers carried	203,228	184,744	I. 1 8,484	58.6
Passenger miles	18,129,140	11,886,882	I. 6,642.258	55.9
Tons freight carried	683,544	636,686	I. 4 ,8'8	7.4
Ton miles	123,867,744	109,178,009	I. 14,689,765	13.4
Av. receipt:				
Per pass. per mile	3.50cts.	3.77cts.	I. 0 02ct.	0 6
Per ton per mile	1.18 "	1.99 "	D. 0.10 "	5.0

The increase in passenger traffic was very large and that in freight was large also, when the drawbacks of the year are considered.

The earnings for the year were as follows:

	1881.	18-0.	Increase.	P. c.
Freight	$2,342 609.80	$2,180,332.63	$16 ,277.17	7.5
Passengers	665,330.89	424,101.62	241,229.27	56.9
Mail, etc	152,582.56	93,936.42	58,646.14	62.4
Total	$3,160,523.25	$2,698,370.67	$462,152.58	17.2
Expenses	1,582,057.12	1,325,128 51	256.928.61	19.4
Net earnings	$1,578,466.13	$1,373,242.16	$205,223.97	14.9
Gross earn. per mile	5,064.94	4,497.28	567.66	12.6
Net earn. per mile	2,529.50	2,288.74	240.85	10.5
Per cent. of exps.	50.06	49.13	0.93	....

The expenses include taxes and improvement account. Excluding those items, the working expenses last year were $1,-335,182.35. The taxes were $93,937.97, and improvement account $152,886.80.

The report of General Manager Rogers refers to improvements made on the road. During the year 46¼ miles of track were laid with steel rails, making 457¾ miles now laid with steel. Much work has been done in ballasting up and improving the road-bed, and 18⅝ miles of new sidings have been built. A large amount has been expended in repairs of bridges, and several new iron bridges have been built. The buildings have generally been kept up and many improvements made.

Additions to the equipment included 8 engines; 1 directors' car, 6 passenger cars and a half-interest in 2 Pullman cars; 148 freight, 4 caboose and 2 wrecking cars. Twelve engines, 12 passenger cars and 164 freight cars are under contract

The income account is as follows:

Net earnings as above		$1,578,436.13
Mileage and interest received		50,648.18
Total		$1,629,114.31
Interest on bonds	$821.49 .00	
Dividends on first-preferred stock	315,000.00	
Amount due leased lines	102,574.67	
Expenses in New York	5 .997.98	
Interest accrued, but not due	109,864.83	1.444.839.48
Surplus for the year		$184,274.83

The recent change in the ownership of the stock may effect the new extensions under construction, but to what extent has not been made public.

President Winslow's report refers at length to the execution of the consolidated mortgage for $30,000,000, in which it is proposed to fund all the outstanding debt of the company. Under this mortgage $1,000,000 new bonds have been issued to furnish means for new extensions.

Progress has been made in the consolidation of the companies owning the new lines and extensions. These corporations are all owned and controlled by this company, and are to be consolidated with it as soon as the necessary formalities can be completed.

The President also refers at length to the progress of the Atlantic & Pacific road under the joint ownership of this company and the Atchison, Topeka & Santa Fe.

Chicago, Milwaukee & St. Paul.

This company makes the following preliminary statement for 1881:

Gross earnings		$17,025,461.66
Operating expenses, including taxes		10,317,931.14
Net earnings		$6,707,530.52
Interest and other income	$324 192.14	
Sales of land	311,196.23	
		635,308.37
Total		$7,342,838.37
Interest on bonds		4,127,389.12
Surplus		$3,215,449.77
Dividend 3½ per cent. paid October, 1881		992,416.04
Balance		$2,223,033.73

A dividend of 3½ per cent. on the common and preferred stock has been declared, payable in April. This will require $1,218,201.04, leaving a balance of $1,004,832.69 to profit and loss.

The amount of capital stock reported is $14,401,482 preferred, and $20,404,261 common stock.

Union Pacific.

The report of this company for 1881, like that for 1880, includes the whole system of roads worked, 3,570 miles at the close of the year, an increase of 449 miles during the year.

The equipment of this system consists of 438 engines; 116 first-class passenger, 29 second-class, 42 sleeping, 30 emigrant, 40 emigrant sleeping, 1 observation, 13 combination and 112 mail, baggage and express cars; 4,788 box, 1,079 stock, 1,484 coal, 10 charcoal, 1,373 flat, 12 hay and 202 way or caboose cars; 7 officers' cars, 4 pay-cars, and 51 service cars.

Additions during the year were 31 locomotives; 4 baggage and express cars; 875 box, 225 stock, 100 flat and 17 caboose cars; 6 service cars.

The general account, somewhat condensed, is as follows:

Stock		$60,808,500.00
Funded debt, as below		82,118,133.75
U. S. subsidy bonds	$33,539,512.00	
Interest accrued	28,068,627.42	
Total	$61,608,139.42	
Less interest repaid by transportation	15,478,239.66	
		46,129,899.76
Bills, accounts and balances payable	$0,508,288.87	
Less cash and cash assets	5,473,210.78	
		4,035,078.09
Interest accrued, not yet due		780,705.82
Income account, surplus	$4,562,157.07	
" " used for sinking funds	873,000.00	
Income account, collateral trust	90,983.47	
" " land and trust	1,585,725.93	
Total	$7,111,866.47	
Less balance of interest on U. S. bonds	566,908.05	
		6,544,868.42
Total		$200,477,245.84
Road and fixtures	$156,878,660.04	
Securities of other roads, as below	28,534,278.29	
Securities held by trustees consol mortgage	2,105,950.00	
Securities of the company owned	164,045.93	
Denver Extension sinking fund	199,545.00	
Coal lands and mines	100,178.10	
Miscellaneous stocks and bonds	596,531.35	
Advances on roads not completed	2,563,359.76	
Land Department assets	6,974,212.06	
Materials on hand	3,164,476.25	
		200,477,245.84

Of the United States subsidy bonds $27,236,512 were originally issued to the Union Pacific and $6,303,000 to the Kansas Pacific. Cash items include $1,474,000 Kansas Pacific consolidated bonds received for coupon certificates bought in. The trustees hold $1,500,000 more of the same bonds. Cash items also include $212,669.85 due from proprietary roads.

The stock was increased $10,106,200; bonded debt was diminished $504,984.25 during the year. Cost of property was increased $2,135,039.04.

A detailed statement of the funded debt is as follows:

	Bonds whole issue.	Bonds held by company and Gould & Sage, trustees.	Bonds outstanding.
Union Pacific:			
First mortgage	$27,229,000.00	....	$27,229,000.00
Land grant	5,384,000.00	....	5,384,000.00
Sinking fund	12,71 ,000.00	....	12,715,000.00
Sinking fund r'd	1,146,0.0.00	....	1,146,000.00
Collateral trust bonds	5,060,000.00	....	5,060,000.00
Omaha Bridge	1,965,000.00	5,000.00	1,960,000.00
Kansas Pacific:			
Eastern Division	2,240,000.00	....	2,240,000 00
Middle Division	4,063,000.00	....	4,063,000.00
Leavenworth Br	600,000.00	500,000.00	100,000.00
First land grant	1,480,750.00	1,428,250.00	52,500.00
Second land grant	1,500,000.00	1,499,000 00	1,000.00
Income bonds	263,700.00	187,650.00	76,050.00
Income bonds subordinated	4,011,650.00	3,036,400.00	975,250.00
Denver Exten	6,366,000.00	....	6 366,000.00
Consol'd bonds	14,450,005.00	....	14,450,005.00
Eastern Div. coup. ctfs	297,780.00	297,240.00	540.00
Middle Division coup. ctfs	541,875.00	538,230.00	3,645.00
Denver Exten. coup. ctfs	1,003,467 50	877,065.00	126,402.50
Leavenworth coup. ctfs	93,047.50	56,980.00	36,067.50
First land grant coup. ctfs	246,765.12	243,851.37	2,913.75
Sec'd land grant coup. ctfs	161.595.00	160,020.00	1,575.00
Den. Pac. R'wy.	2,084,000.00	2,002.000.00	82,000.00
Total	$92,902,635.12	$10,831,686.37	$82,070,948.75

Of the bonds held by or for the company $10,784,501.37 are held by the trustees, and $47,185 by the company directly.

The following is a statement of stocks and bonds of other companies owned by the company, and which connect with and contribute to the earnings of this company:

	Stocks.	Bonds.
Union Pacific	$160,'50	....
Omaha, Niobrara & Black Hills	977,000	$977,000.00
Omaha & Republican Valley	786,000	1,572,000.00
St. Joseph & Western	1,536,200	....
Marysville & Blue Valley	64,000	128,000.00
cho & Park City	320,000	480,000.00
Utah & Northern	4,259,400	4,414,000.00
Colorado Central	6,232,000	4,701,0 0.00
Lawrence & Emporia	465,000	465,000.00
Salina & Southwestern	231,000	540,000.00
Denver & Boulder Valley	....	....
St. Joseph Bridge Building Co	500, 00	784,000.00
Central Branch U. P	858,700	....
Kansas Central	917,000	1,016,000.00
Utah & Nevada	438,500	....
Manhattan, Alma & Burlingame	418,050	339,000.00
Nevada Central	912,500	250,000.00
Denver, South Park & Pacific	4,100,900	0 1,000.00
Atchison, Colorado & Pacific	150,1 00	510,000.00
Wahsatch & Jordan Valley	....	10,00 .00
Manhattan & Blue Valley	500,600	....
Colorado Central, of Wyoming	130,000	....
St. Joseph & Pacific	....	1,274,569.00
Kansas & Nebraska	....	1,076,301.40
Hastings & Grand Island	....	375,000.00
Utah Central	1,878,100	....
Utah Southern Extension	....	975,000.00
St. Joseph & Denver City receiver's certificates	....	113,000.00
St. Louis, Council Bluffs & Omaha	....	19,500.00
Total	$25,845,700	$20,920,430.40

Held by trustees of consolidated mortgage bonds.

	Stocks.	Bonds.
Junction City & Fort Kearney	$720,000	$970,000.00
Denver & Boulder Valley	....	538,000.00
Solomon Railroad	2,001,000	575,0 0.00
Golden, Boulder & Caribou	30,000	60,000.00
National Land Co	94,800	....
Total	$2,875,800	$2,143,000.00

The total land and trust income for the year was $791,-598.07, from which $84,000 was paid on account of interest on consolidated bonds, leaving net proceeds $707,598.07. Adding balance from previous year, the amount to credit of this account Dec. 31 was $1,585,725.93.

Of the original issue of $10,400,000 Union Pacific land-grant bonds, $687,000 were canceled during the year, leaving $5,016,000 outstanding Dec. 31. The cash and land contracts held by the trustees amount to $4,314,418.85.

The sales from the Union Pacific land grant were 64,406 acres for $326,903.09. Total receipts from sales, interest and forfeited contracts were $571,807.04; expenses, including premium on bonds canceled, $214,893.40, leaving the net proceeds $356,913.64.

From the Kansas Pacific land grant net sales were 76,981 acres for $327,872.03; total receipts were $445,958; expenses, including premium on bonds canceled, were $132,-945.99, leaving the net proceeds $313,012.61.

The total expenditures for construction during the year were $712,427.23, the largest items being $267,425.59 for new shops and engine-houses and $136,090.40 for Denver yard and freight houses. Expenditures for new equipment during the year were $1,001,481.01, making $1,713,908.24 for additions to the road.

The Laramie rolling mill turned out during the year 10,-613 tons of rerolled iron rails, of which 10,486 tons were 28 lbs. per yard, probably for use on the Utah & Northern narrow-gauge line. Other products of the mill were 1,336,622 lbs. bar iron, 24,733 lbs. nuts, 659,200 lbs. bolts, 651,155 lbs. spikes and 3,448,938 lbs. rail splices.

The traffic for the year was as follows:

	1881.	1880.	Increase.	P. c.
Passengers carried	807,141	....	....	....
Passenger miles	153,570,005	....	....	....
Tons freight carried	2,065,030	....	....	....
Ton miles	783,731,034	660,472,094	122,859,040	18.6

Of the passenger miles 66.2 per cent. were of through and 33.8 per cent. of way passengers; of the number of passengers carried 54.3 per cent. were west-bound and 45.7 per cent east-bound.

Coal sold on the line furnished 8.7 per cent. of the ton miles. The sales of coal along the line were 193,033 tons, for $1,093,833.83, an average of $5.60 per ton. The average haul on coal sold was 358 miles. The total coal mined at the company's mines was 587,493 tons, at an average cost of $1.29 per ton.

The earnings were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Passeng'rs cash.....	$4,922 711.28	$5,171,114.97	D. $248,403.69	4.8
Passeng'rs gov't.. ..	208,860.11	234,010.35	D. 25,150.24	10.7
Freight cash.....	15,075,515.28	13,406,910.18	I. 1,668,605.10	12.6
Freight gov't....	484,013.14	469,025.04	I. 14,988.10	3.2
Freight, Co	1,503,598.78	1 342,572.27	I. 161,026.51	12.0
Mail.....	721,312.34	719,349.84	I. 1,962.50	0.3
Express ..	696,184.12	681,818.02	I. 14,366.10	2.1
Miscel.....	646,622.05	430,333.91	I. 216,288.14	50.3
Total ...	$24,258,817.10	$22,455,134.58	I. $1,803,682.52	8.0
Expenses..	12,480,342.71	10,545,119.52	I. 1,935,223.19	18.4
Net earn..	$11,778,474.39	$11,910 015.06	D. $131,540.67	1.1
P.c.of ex.	51.45	46.96	I. 4.49	...

The decrease in net earnings is accounted for by the large amount expended for new rails, this amount being $590,749.39 in excess of 1880. The renewal of rails for 1882 is not expected to be more than one-half the amount for 1881.

The income account was as follows:

Net earnings, as above		$11,778,474.39
Interest	$4,914,671.23	
Less interest on investments	1,332,678.31	
Balance of interest	$3,581,992.92	
Sinking fund payments	307,000.00	
Due United States on business of the year	1,653,358.81	
Premiums, etc	21,653.08	
Dividends, 7 per cent	4,076,134.13	
		9,640,138.94
Surplus for the year		$2,138,335.45
Balance to credit of income Dec. 31, 1880	$2,521,877.61	
Less transfers to adjust accounts	98,055.99	
		2,423,821.62
Balance, credit, Dec. 31, 1881		$4,562,157.07

Income from bonds owned by the company, but deposited in trust for security of the collateral trust bonds, and the interest and sinking fund of said collateral trust bonds, are not included in the foregoing account.

The result of the year has been an increase in earnings of fair amount; a considerable increase in expenses, but not more than might have been expected from the greater mileage worked, the severe winter and general causes; and a slight consequent decrease in net earnings. The new mileage added has probably very light earnings and part of it was added late in the year, increasing very little the gross receipts, while it added somewhat to the expenses. It is to be regretted that no separate account is given of the business of the main stem from Omaha to Ogden, which would make a comparison with previous years possible.

Delaware & Hudson Canal.

This company owns a great anthracite coal property in the Lackawanna District, to which its canal and railroad operations are chiefly auxiliary. It owns the Delaware & Hudson Canal, from Honesdale, Pa., to the Hudson River at Rondout, N. Y., and owns or leases and works the following railroads:

	Miles.
Plymouth, Pa., to Nineveh, N. Y.	58.50
Branches and gravity roads	98.25
Cherry Valley, Sharon & Albany	21.00
Schenectady & Duanesburg	13.75
Total owned	191.50
Albany & Susquehanna, leased	142.25
Rensselaer & Saratoga and branches, leased	182.75
New York & Canada, leased and stock owned	150.00
	475.00
Total railroad worked	666.50

Adding the canal, there are 774.5 miles of transportation lines worked, The report is for the year ending Dec. 31.

The general account is as follows, condensed:

Stock		$20,000,000.00
Bonds		18,843,000.00
Notes payable, depositors, etc		126,757.29
January interest and dividends		696,296.25
Surplus		1,236,430.68
Total		$40,902,484.22
Canal	$6,339,210.49	
Railroad and equipment	6,456,258.24	
Other railroads owned	5,191,607.48	
Real estate, mines and machiery, etc	11,757,115.02	
Boats, barges and steamboats	585 032.07	
Coal yards and fixtures	105,364.74	
Telegraph lines	14,734.80	
Advances to leased lines	400,015.01	
Al. & Susquehanna second track	1,074,808.00	
Miscellaneous assets, stocks and bonds	2,985,349.28	
Advances on coal royalties	615,513.62	
Coal on hand	345,075.03	
Supplies	1,148,323.00	
Bills and accounts receivable	1,156,687.63	
Cash and demand loans	2,727,389.81	
		40,902,484.22

There were no changes of importance in the assets except a decrease of $1,309,358.13 in stocks and bonds owned, and the item for Albany & Susquehanna second track, which is new. The bonded debt was diminished by $994,000.

The miscellaneous assets are reported as follows:

Albany & Susquehanna, 8,540 shares		$854,000.00
Rensselaer & Saratoga, 8,241 shares		822,137.50
Sundry stocks		91,640.84
Total stocks		$1,767,778.34
Jefferson R. R. bonds	$86,710.00	
Albany & Susquehanna consols	762,000.00	
Miscellaneous bonds	368,860.94	
		1,217,570.94
Total		$2,985,349,28

Changes during the year were a reduction of $39,836.33 in miscellaneous stocks, and of $7,020.34 in miscellaneous bonds; an increase of $487,000 in Albany & Susquehanna consols; the disappearance from the account of the Boston, Hartford & Erie bonds, in 1880 charged at $78,727.71, and of 963 bonds of this company, charged at $962,773.75.

The coal business of the year was as follows:

	1881.	1880.
To tidewater by canal and rail	1,776,591	1,531,951
South from mines	76,866	59,399
West " "	585,596	480,576
North, by Albany & Susquehanna	649,665	402,785
Local sales	122,778	199,994
Total company's coal	3,211,496	2,674,705
Transported for other parties	450,296	372,889
Total	3,661,792	3,047,594

The total tonnage was the largest ever reported by this company. Not only was the tonnage large, but the prices obtained for the company's coal were uniform and generally satisfactory. The total increase in company's coal was 586,791 tons, or 20.1 per cent.

The operations of the 475 miles of leased railroads were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Passengers	$1,365,867.12	$1,241,570.36	I. $124,296.76	10.0
Freight	3,170,903.41	2,802,506.59	I. 368,396,82	12.9
Miscellaneous	62,155.49	67,410.25	D. 5,254.76	7.8
Total	$4,598,926.02	$4,111,487.20	I. $487,438.82	11.9
Working expenses	2,823,420.18	2,392,462.67	I. 430,957.51	18.0
Net earn.	$1,775,505.84	$1,719,024.53	I. $56,481.31	3.3
Rental charges	1,749,323.21	1,733,667.46	I. 15,655.75	0.9
Net gain	$26,182.63	.....	.....	....
Net loss	.....	$14,642.93	.....	....
Gross earn. per mile	9,681.94	8,655.76	I. $1,026.18	11.9
Net earn. per mile	3.737.91	3,619.00	I. 118.91	3.3
Per cent. of exps	61.39	58.19	I. 3.20	....

There was a very considerable increase, though not as great as shown in 1880 over the previous year.

The profit and loss account, showing the result of the year, was as follows:

	1881.	1880.
Sales of coal	$9,328,763.13	$7,210,524.86
Canal tolls	58,400.71	42,810.30
Net earnings, railroad in Pennsylvania	805,913.89	561,948.70
Profits on leased line	96,182.53	.....
Interest on investments	301,858.09	312,243.18
Miscellaneous profits	117,354.32	93,516.41
Coal on hand Dec. 31	345,075.03	727,283.68
Total receipts	$11,083,547.70	$8,948,327.13
Coal on hand Jan. 1	727,283.68	535,264.65
Mining coal	3,985,304.49	3,171,369.33
Transportation expenses, canal, etc	1.594,385.27	1,398,133.61
Transportation to tidewater, by Erie road	755,330.99	637,005.23
Rondout expenses	143.594,24	129,934.42
Taxes	220,706.80	181,978.78
Salaries and miscellaneous	133,626.58	141,359.88
Weehawken expenses	46,067.44	43,241.90
Interest	1,374,784.43	1,343,973.69
Loss on leased lines	.....	14,042.93
Total expenses	$8,981,083.92	$7,596,904.42
Balance, surplus	$2,102,463.78	$1,351,422.71

No statement of the operation of the railroads in Pennsylvania is given, except the net earnings above.

President Dickson's report says: "The business of the year yielded a profit on the capital stock of a fraction over 10¼ per cent. The policy of restriction was judiciously applied by the producing companies during the year, benefiting producer and consumer alike. Nearly uniform prices were maintained, and the violent fluctuations which are inseparable from an overstocked market were avoided, and while prices were fairly remunerative to the producer, they were satisfactory to the consumer, and led to the consumption of the largest required quantity. Consumption not having overtaken the ability to produce, the mines were operated on half time for nearly the first half of the year.

"The leased lines of the company show satisfactory results, inasmuch as they are self-sustaining, and the fact that they now furnish a market for 750,000 tons of coal annually, which is constantly and rapidly increasing, is a sufficient indorsement of the policy that led to their acquisition.

"The rapid development of the iron and ore interests in the Lake Champlain region, and the large increase in the coal and miscellaneous traffic, is taxing our present equipment and facilities to their utmost: to meet which, and to prepare and provide for further increase in business, a portion of the Albany & Susquehanna Railroad is being double tracked. Thirty-five miles have been completed and are now in use, and 15 miles are now under construction. The double track will cover that portion of the road which has the highest grades and is the most difficult to operate. This improvement will add largely to its transportation capacity, and will increase the economies of handing.

"The financial condition of the company is strong, and will doubtless be satisfactory to the stockholders. During the year $994,000 of the bonds of the company, which were purchased from time to time, have been retired and canceled, thereby reducing the bonded debt."

Hannibal & St. Joseph.

This company owns and works a line from Hannibal, Mo., to St. Joseph, 206.41 miles; branches from St. Joseph to Atchison, Kan., 19.47 miles; Cameron, Mo., to Kansas City, 53.05 miles; Palmyra, Mo., to Quincy, 13.42 miles; a total of 202.35 miles. The report is for the year 1881, during which there was no change in mileage.

The equipment consists of 76 locomotives; 29 passenger, 4 reclining chair and 14 baggage and mail cars; 674 box, 9 refrigerator, 444 combination, 102 stock, 74 flat, 404 coal and 36 caboose cars; 1 directors' car, 1 pay car, 1 derrick, pile-driver and 2 wrecking cars; 58 hand-cars, 61 rubble cars and 6 velocipede hand-cars.

The capital and general accounts are as follows:

Stock, preferred		$5,083,024.00
" common		9,168,700.00
Total stock		$14,251,724.00
Bonds		8,363,000.00
Total		$22,884,724.00
Cost of property	$13,826,923.44	
Discount and depreciation	6,497,639.86	
		20,324,563.30
Balance to general account		$2,560,160.70
Balance from revenue account		162,497.41
Accounts payable, less collection accounts		70,456.93
Coupons and dividends unpaid or accrued		308,185.50
Profit and loss		476,083.63
Total		$3,577,382.17
Cash	$470,512.42	
Bills, accounts and balances	130,410.56	
Supplies on hand	140,770.76	
Elevator purchase	61,000.00	
Securities, etc., held for investment	29,708.34	
Land-grant sinking fund bonds	135,000.00	
Land Department	2,555,341.95	
Balance of suspended and doubtful accounts	54,638.14	
		3,577,382.17

The bonded debt consists of $4,000,000 convertible 8 per cent. bonds; $1,200,000 Kansas City & Cameron 10 per cent. bonds; $433,000 Quincy & Palmyra 8 per cent. bonds, and $3,000,000 consolidated 6 per cent. bonds. The interest charge is $654,640 per year.

The Land Department reports total receipts of $384,260.22 on land contracts. Expenses were $22,527.78, leaving a net balance of $261,732.44.

From this, $37,559.17 of the free land income was paid into the company's treasury, and appears among the items of income. From the balance, the Farmers' Loan & Trust Company has paid the interest on the bonds of 1878 and $175,000 of the principal has been retired. Only $140,000 of these bonds remained at the close of the year 1881, $50,000 of which have at this date been drawn.

On May 1 a new land trust was created (subject to the old assignment for redemption of the land bonds of 1878), pledging the entire land revenue for the redemption of the bonds of old mortgages in excess of the amount of the new consolidated mortgage.

Under this, the trustees had received to Jan. 1, 1882, $29,641.27, and at this date they have in hand $37,705.87, of which $37,000 has been invested in Hannibal Union Depot Company's bonds, taken at par and bearing 6 per cent. interest. Investments of this fund in approved securities will be made from time to time, as it accumulates. On all cash balances the Trust Company allow interest at 3 per cent.

The earnings for the year were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Passengers	$546,885.07	$553,839.58	D. $6,954.51	1.3
Freight	1,529,631.93	1,713,078.62	D. 183,246.69	10.7
Mail and exp	92,757.29	77,509.45	I. 15,247.84	19.6
Miscellaneous	87,757.05	216,962.86	D. 129,205.81	59.6
Total	$2,257,231.34	$2,561,390.51	D. $304,159.17	11.8
Expenses	1,437,292.09	1,304,590.08	I. 132,702.01	10.2
Net earnings	$819,939.25	$1,256,800 43	D. $436,861.18	34.8
Gross earnings per mile	7,720.99	8,761.38	D. 1,040.39	11.8
Net earnings per mile	2,804.65	4,298.96	D. 1,494.31	34.8
Per ct. of exps.	63.67	50.93	I. 12.74	....

The decrease in earnings was due to the loss in freight traffic and general demoralization of business from Missouri River points. Expenses were increased by heavy renewals, by bad weather and by greater cost of supplies.

The income account was as follows:

Net earnings, as above		$819,939.25
Interest and exchange		15,628.86
Premium on consolidated bonds		288,978.10
Property sold		26,166.51
Net proceeds free land sales		37,559.17
Total		$1,188,271.89
Interest on bonds	$654,640.00	
Hire of cars	15,326.48	
Dividends on preferred stock	355,810.00	
		1,025,776.48
Balance, surplus for the year		$162,495.41

From this surplus the sum of $108,687.99 was expended for new construction and new equipment, leaving a balance of $53,813.42. The net earnings from the road were $205,837.23 less than the interest, dividends and car-hire paid.

The traffic for the year was as follows:

Train miles:	1881.	1880.	Inc. or Dec.	P. c.
Passenger	426,563	410,368	I. 16,195	3.9
Freight	1,065,511	975,603	I. 89,908	9.2
Car miles:				
Passenger train	2,432.735	2,239,970	I. 192,765	8.6
Freight	18,012,188	16,864,202	I. 1,147,986	6.8
Passengers carried	352,370	324,220	I. 28,150	8.7
Passenger miles	20,948,599	19,925,041	I. 1,023,558	5.1
Ton freight carried	661,340	716,730	D. 55,370	7.7
Ton miles	107.830,360	120,665,740	D. 12,835,380	10.6
Av. train load:				
Passengers, No.	48.00	48.00	.....	....
Freight, tons	101.20	123.70	D. 22.50	18.2

The decrease in freight was due to the greatly diminished shipments of grain from the Missouri River points. The coal tonnage was also somewhat diminished by a miners' strike. Locomotives ran in all 2,172,944 miles, at a cost of 16,63 cents per mile.

The average freight per loaded car was 9.01 tons; average for all cars, 5.98 tons. Of the freight car mileage, 66.3 per cent. was of loaded cars, against 77.8 per cent. in 1880. Through business was 61.5 per cent. of the passenger travel, and 72.8 per cent. of the freight traffic. Of the total ton mileage, 69.5 per cent. was west-bound freight.

The receipts per unit of traffic, etc., were as follows, in cents:

	Passenger.		Freight.	
	1881.	1880.	1881.	1880.
Receipt per mile carried	2.500	2.760	1.260	1.214
Cost " "	2.200	2.200	0.890	0.717
Net " "	0.300	0.560	0.370	0.497
Cost per car mile	19.230	19.610	5.373	5.130
Cost per train mile	109.670	107.040	90.950	88.690

During the year 3,935 tons of steel rails were laid; 248.8 miles of the road are now laid with steel. There were 17,239 ft. of new sidings built. Grading has been completed for long passing tracks at several points. There were 123,570 new ties put in the track. Extensive renewals of bridges were made and bridge masonry built at several points. Much work was made necessary by the very severe winter and the heavy spring floods.

In the shops, besides an unusual amount of repair work, 100 new box cars and 3 way cars were built and 2 new mail cars begun. Bids have been called for a number of stock cars 34 ft. long, which can be used also in the lumber traffic.

The report of the President, Mr. Wm. Dowd, says: "In accordance with the resolutions adopted at your special meeting, April 11, 1881, $3,000,000 of new bonds of the company, bearing 6 per cent. interest, have been issued, and with the proceeds, $3,000,000 were, on June 20, 1881, paid to the state of Missouri on account of the state's statutory mortgage for $3,000,000, thus relieving the company from obligation as to the principal of the state aid bonds. A question has arisen which is now in litigation as to whether the above-mentioned payment discharged the company absolutely from all liability to further idemnify the state against the payment of interest on the state aid bonds, or whether the company is still bound to make up the difference between the amount earned by the state upon the money paid to her and the interest which she is obliged to pay upon her bonds. Before the payment was made a law was enacted by the Legislature of Missouri, providing for the application of the money to the extinction of the outstanding 6 per cent. indebtedness of the state. The actual amount in controversy is, therefore, the loss of interest to the state between the time of the payment to her and the time of the application of the money by her. The time has already arrived at which the greater part of the money can be immediately applied.

"The union depots at St. Joseph and Hannibal are rapidly approaching completion, and both will be ready for occupancy in April next.

"I congratulate you on the success of the year's business, when we take into consideration the terrible snows of last winter, the stoppage of business over the Kansas City bridge by reason of the springfloods, the short crops of the past season throughout the entire Southwest and the war of rates.

"The prospects for business of the coming year are certainly more flattering than at this time last year, as we are now receiving remunerative prices for traffic, and the Southwestern Railway Association has been reorganized on a more permanent and satisfactory basis than ever before."